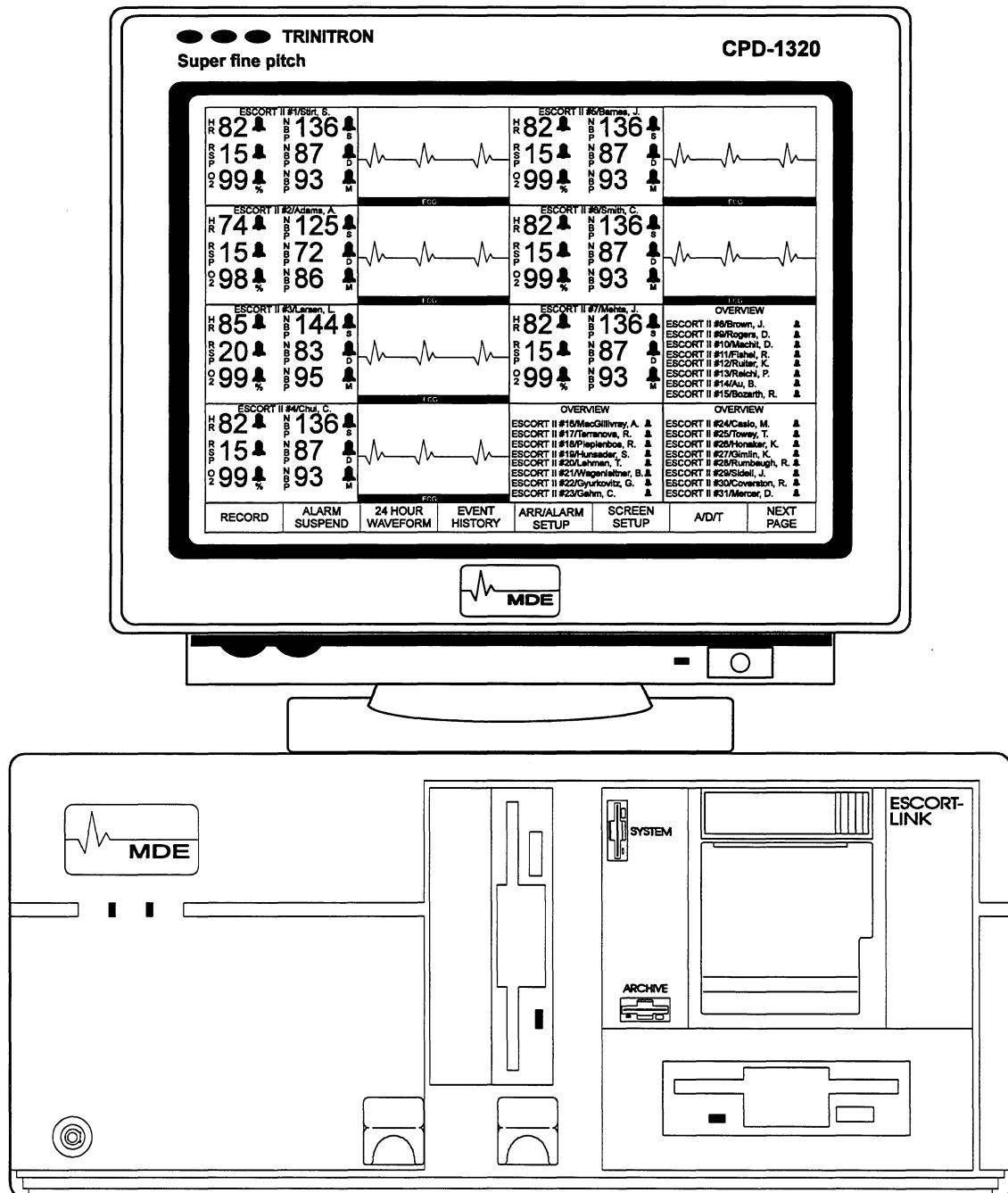


ESCORT - LINK

MODEL 3200B

CENTRAL STATION

SERVICE MANUAL



Medical Data Electronics
MDE P/N E9040-52
Revision - C
January 1995



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PATENT INFORMATION

MDE US Patents: 4,757,520; 4,922,918

WARRANTY

The ESCORT - LINK Model 3200B Central Station is warranted against defects in materials and workmanship for a period of twelve (12) months from the date of shipment to the original purchaser. Batteries, cables, cuffs, and sensors are warranted three (3) months from date of shipment. Warranty is valid only to the original buyer. Defective equipment should be returned freight prepaid to Medical Data Electronics. Equipment returned with defective parts and assemblies will be either repaired or replaced. This warranty is not applicable if repair has been attempted or if the instrument has been damaged due to operation outside the environmental and power specifications for the product, or due to improper handling or use.

If any fault develops, notify MDE giving full details of the difficulty, and include the model and serial number of the device. Upon receipt of the shipping instructions, forward the device prepaid and repairs will be made at the factory.

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Toll Free Technical Service	(800) 237-5243
Technical Service	(818) 768-6411
MDE FAX Line	(818) 768-0759

Written requests for information should be addressed to:

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12720 Wentworth Street
Arleta, CA 91331-4309

SECTION PLAN

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Disassembly

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Chapter Summaries

A brief description of each chapter is provided below.

Chapter 1 - Introduction

This chapter introduces the ESCORT - LINK Central Station. All system specifications are presented followed by a system overview.

Chapter 2 - Installation

This chapter provides detailed instructions for setting up the ESCORT - LINK Central Station and associated components. The system is discussed from the time it is received and unpacked to the time the AutoNet wireless network is up and running.

Chapter 3 - System Components

This chapter offers a brief description of each major system component (i.e., LINK Base, LINK Display, LINK Auxiliary Base (LAB)). Control and interface boards located in the LINK Base are also discussed.

Chapter 4 - Theory of Operation

This chapter details the communications structure and scheme utilized by the Model 3200B Central Station. The system Power Levels diagnostic screen is discussed in detail. Additional information is provided for the Transceiver Module and the LAB.

Chapter 5 - Troubleshooting

Tabulated information is presented for streamlined troubleshooting and fault isolation. Consult this chapter when experiencing difficulties with the Model 3200B Central Station.

Chapter 6 - Mechanical Disassembly

This chapter describes the methods necessary to disassemble the ESCORT - LINK Central Station. Detailed instructions are provided for disassembly of the LINK Base and LAB.

Chapter 7 - LINK Options

LINK options discussed in this chapter include Full Disclosure (24-hour waveform), Patient Archives, Arrhythmia Monitoring (up to 8 patients), the HP LaserJet 4L Trend Printer, and the Uninterruptible Power Supply (UPS).

Appendix A - Spare Parts & Accessories

This appendix presents spare parts and accessories available from Medical Data Electronics for the Model 3200B Central Station.

Appendix B - Central Station Software

This appendix displays the Central Station software keys and options. Each software *branch* is presented to familiarize the operator with all system selections and settings.

Appendix C - Configuration

This appendix provides configuration instructions for the Central Station. Automatic and manual methods are both discussed. All *auto config* options are displayed. *Manual configuration* items such as default waveform selection, arrhythmia and alarm control, and parameter tile setup are discussed.



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ESCORT II - LINK Model 3200B Central Station





INTRODUCTION

1.1 System Overview

The ESCORT - LINK Model 3200B Central Station and associated components form the ESCORT - LINK AutoNet™ Wireless Network, providing centralized surveillance and documentation of up to thirty-two (32) portable bedside monitors. Patient vital signs and waveform data are available for viewing on the LINK Central Station Display. Seven user-selectable *auto configurations* are available for 4, 6, 8, 12, 16, 23, or 31 remote ESCORT II bedside monitors. The operator may also *custom configure* the system for any number of bedside monitors (not exceeding 32). All parameter and waveform data acquired at the bedside monitors may be transmitted to the Central Station and displayed upon request. Up to six parameters can be displayed for each patient accompanied with waveform data such as ECG, respiration, SpO₂, blood pressure, or CO₂.

The Central Station is comprised of the LINK Base, LINK Display, and the LINK Auxiliary Base (LAB). The LINK Base houses the system motherboard, VGA controller, touchscreen controller, Smart Hostess, and Recorder Interface boards (PCBAs). Also installed in the LINK Base are the system hard disk drive (HDD), system 3 1/2" floppy disk drive (FDD), switching power supply, thermal array recorder, Input/Output, and archive disk drive (optional). The Central Station utilizes a 13" VGA color display for program use and data presentation. The LINK Display operates at a resolution of 640x480 pixels and is equipped with a touchscreen interface to provide ease of use while eliminating the need for a keyboard, mouse, trackball, or other input device.

All communications between the Central Station and the ESCORT II bedside monitors are routed through the LINK Auxiliary Base (LAB). The LAB is placed in close vicinity of the Central Station (within 6 feet) and provides an external base for the transceiver module. The LAB processes all transmissions to and from the Central Station.

The network employs Spread Spectrum radio communication technology, a method that was originally introduced by the U.S. Government for military applications. Spread spectrum signals are distributed over a wide range of frequencies and then collected onto their original frequency at the receiver. The received signals appear transparent to other transmissions in the area. This *stealth-like* ability provides more reliable communications while also eliminating interference.

Communications are based on a five hundred millisecond (500 msec) RF cycle. During this cycle the Central Station determines all communicating nodes (ESCORT II bedside monitors and AutoNet repeaters), executes all transmissions, and in the time remaining, performs transmission retries. Sixty (60) bytes of waveform data are transmitted at 120 Hz every 500 milliseconds.

Wide range wireless communication is provided by routing data through bedside monitors and repeater modules back to the Central Station. The Central Station oversees all communications activity, allowing each system component to receive and pass information without interruption to patient monitoring.

Available options for the Model 3200B Central Station include Arrhythmia monitoring (up to 8 patients), Full Disclosure (24-hour storage of displayed waveform information for up to 8 patients), Trend Printer (HP LaserJet 4L), and Archive Data Storage (additional 3 1/2" floppy disk drive).



Figure 1-1 presents the ESCORT - LINK Model 3200B Central Station, while Figure 1-2 provides the ESCORT II 100 and 300 series bedside monitors. Both Figures 1-1 and 1-2 constitute the main system components for reference purposes. Figure 1-3 provides a graphical representation of a typical hospital configuration. The lines connecting the *nodes* represent the communications path to the Central Station.

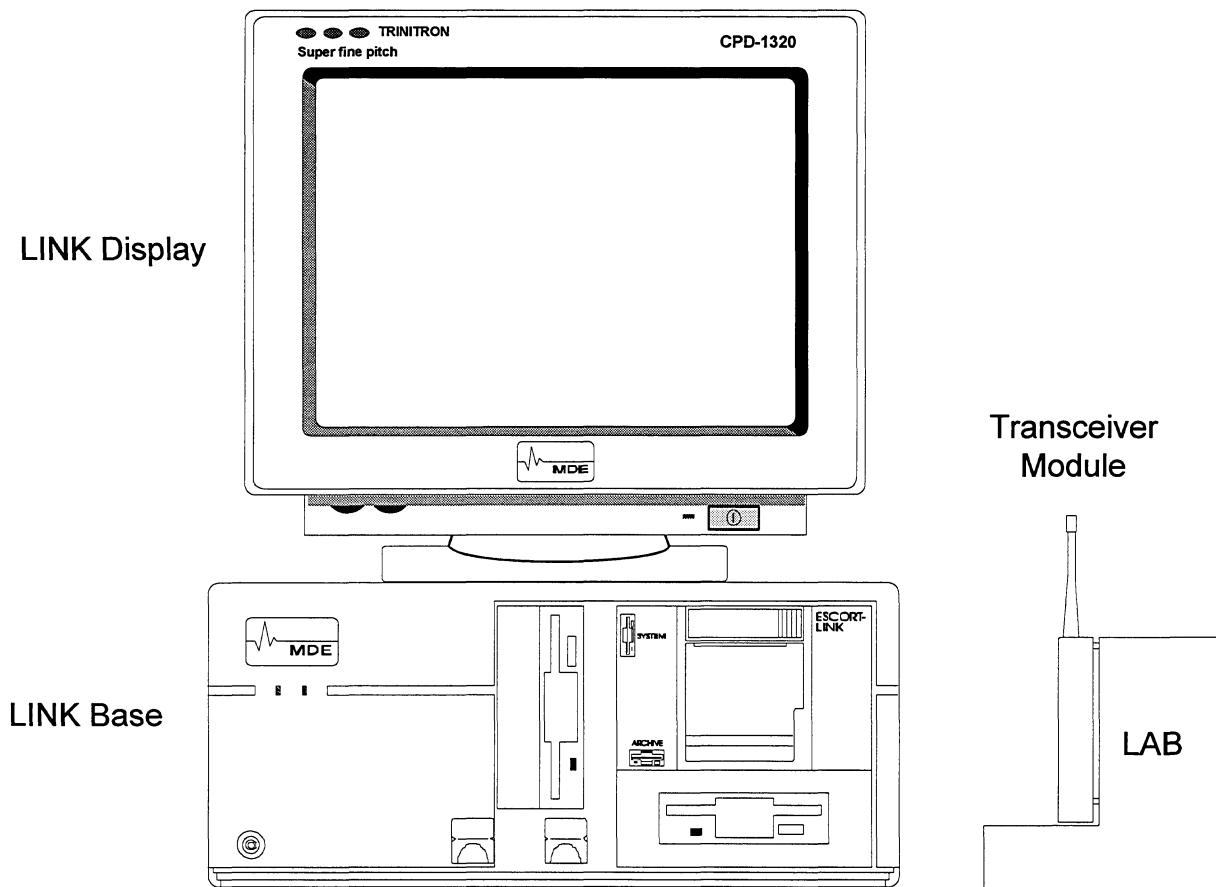


Figure 1-1: ESCORT - LINK Model 3200B Central Station

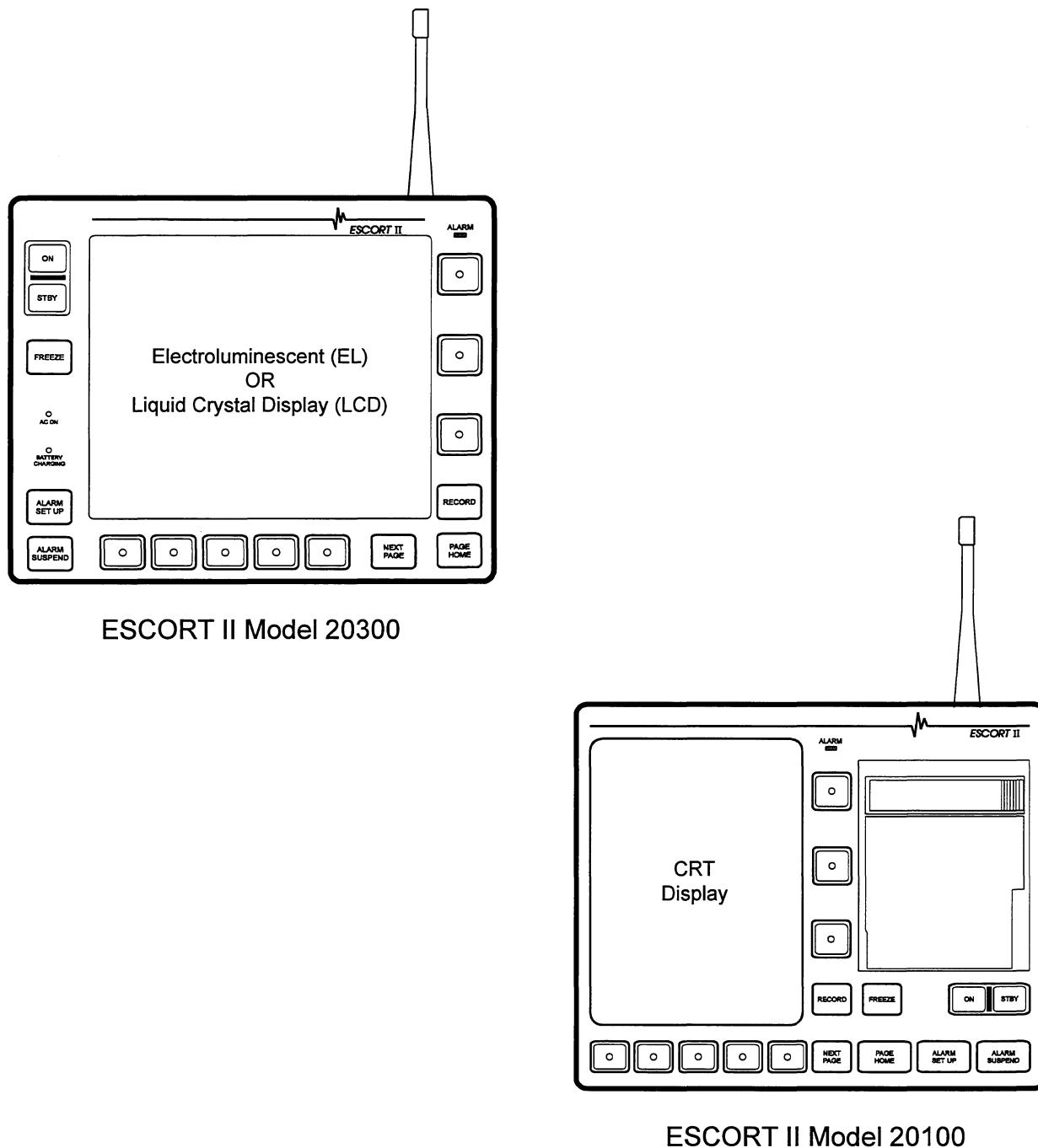


Figure 1-2: ESCORT II 100 & 300 Series Bedside Monitors

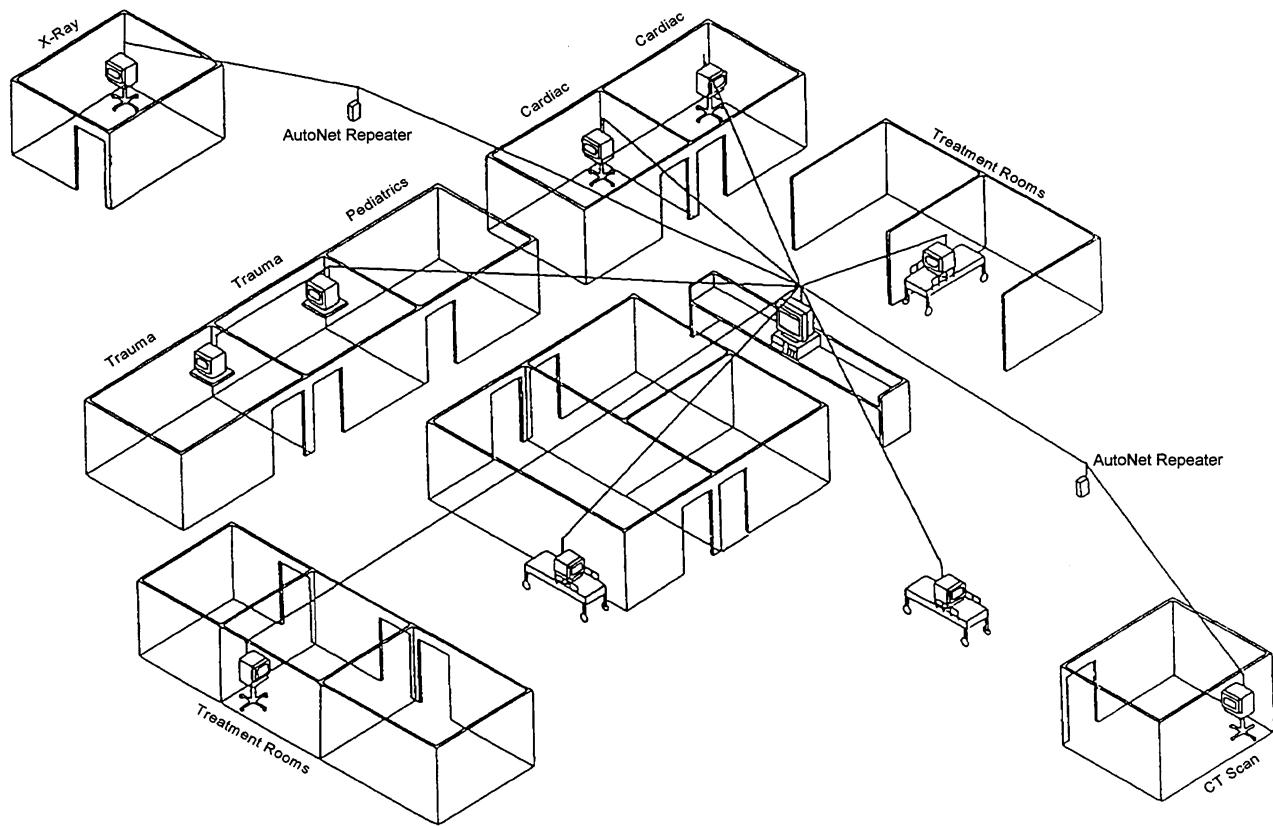


Figure 1-3: ESCORT - LINK AutoNet™ Wireless Network



1.2 Specifications

CENTRAL STATION

Display Type: 13" (33 cm) color, computer video display

Display Resolution: VGA 640 x 480 pixels

Central Processor: Standard 486DX-33 MHz

Memory: 8 MB RAM

200 MB HDD with Full Disclosure option

User Interface: Touchscreen

Number of Patients Monitored: 1 to 32

Waveforms Displayed: Up to 8 waveforms, selectable

Parameters Monitored: HR, RR, 1BP (SYS, DIAS, MEAN)

NIBP (SYS, DIAS, MEAN), SpO₂, ETCO₂, T

Number of Parameters Monitored Per Patient: Up to 6

Patient Data Display: 3 formats selectable depending on number of patients monitored:

- 1) Parameters, waveform, and alarm status
- 2) Parameters and alarm status
- 3) Alarm status only

Trending: Tabular and graphical for 32 patients. 6 parameters per patient:

1 and 24 hour plots 10 seconds sampling intervals;

1 hour windows selectable within last 24 hours

Alarm Response Time From Bedside: 3 seconds

Alarm Handling: Central Station ALARM SUSPEND key temporarily suspends audible alarms for 3 minutes. Alarm limits are adjusted, enabled, and disabled via the bedside monitor

RF TRANSMISSION

Transceiver Frequency: 902 - 928 MHz, Spread Spectrum

Transmission Power: 50 mWatts

Technology: Spread Spectrum

Range Without Repeaters: 500 ft (152 m) outdoor line of sight

250 ft (76 m) indoor line of sight

200 ft (61 m) through wood/concrete walls

100 ft (30.5 m) through metal stud walls

Longer ranges attainable with AutoNet™ repeater(s)

Network Protocol: Proprietary MDE bidirectional digital LAN with auto retry transmission intelligence

ESCORT-LINK AutoNet™ TRANSCEIVER MODULE

Indicator: Green LED indicates good communication

Frequency Range: 902 - 928 MHz, Spread Spectrum

Transmission Power: 50 mWatts

LINK AUXILIARY BASE (LAB)

Function: Interfaces E3200B to AutoNet™ Wireless Network

Size: 7.5 x 3.125 x 7.25 inches/19.1 x 8 x 18.4 cm (HWD)

Weight: 3.12 lb (1.4 kg)

AC Main: 115/230 VAC selectable 48 - 62 Hz auto sensing: 16 watts Max

Environment: 5 to 40° C, 0 to 90% humidity

AUTONET™ REPEATER

Mounting: Wall mount

Size: 5.5 x 2.5 x 1.5 inches/13.3 x 6.3 x 3.8 cm (HWD)

AC Main: 115 VAC; 48 - 62 Hz auto sensing. 20 Watts

230 VAC; 48 - 62 Hz auto sensing. 20 watts



RECORDER

Print Method: Thermal Array
Channels: Single
Resolution: 8 dots/mm vertical, 32 dots/mm horizontal
Paper: 40 mm grid 50 mm paper width
Speed: 12.5, 25 mm/sec
Manual Record Duration: 20 seconds
Memory: 16 seconds
Annotation: Time, date, parameter values, ID, source, speed, abnormal events with arrhythmia option

RS232 INTERFACE

19.2K baud
Real time data
All vital signs and displayed waveform information can be transmitted from the system

ARRHYTHMIA

Number or Arrhythmia Channels: 1 to 8
Types of Detected Events: Asystole, vfib, missed beats, run, couplet, high & low heart rate, high abnormal count, tachy, bigeminy, trigeminy, and slow run
Display: Split screen showing the most recent alarm event below the real time ECG
Alarm History Storage: 100 events per patient; 20 seconds per event with 12 seconds preceding the event
Type of Algorithm: Heuristic algorithm using template matching and feature extraction
Documentation: Thermal array recorder and/or LaserJet printer

FULL DISCLOSURE

Waveform Storage: 24 hours, one waveform from up to 8 patients
Waveform Display: 20 and 80 seconds expanded waveform with 13 minutes compressed waveform
Labeling: Heart rate, abnormal count, alarm event
Trends: All abnormalities, premature normals, runs, missed and paced beats
Documentation: Thermal array recorder or optional LaserJet printer

ARCHIVAL DATA STORAGE

Data: 24 hours of up to 6 parameters with 10 second sample resolution per patient file
Storage: 3 1/2" dedicated floppy disk
Initiation: Manual

LASERJET PRINTER

Type: HP LaserJet 4L
Environment: 50 to 91° F (10 to 32.5° C)
20 to 80% humidity
AC Main: 110/120 VAC 50/60 Hz (\pm 2 Hz)
Power: 5 watts (standby); 180 watts (printing)
Size: 14.5 x 14 x 6.5 inches/36.2 x 35.3 x 16.4 cm (HWD)
Weight 15.5 lb (7 kg)

UNINTERRUPTIBLE POWER SUPPLY (UPS)

Power Protection: Provides up to 9 minutes of operation
Nominal Input Voltage: 120 VAC, 60 Hz \pm 3%
Voltage at Which Backup Power Activates: 103 VAC
Output Voltage: 115 VAC, line synchronized
Waveform: Modified sine wave
Environment: 0 to 40° C
 0 to 95% humidity
Weight: 25 lb (12.2 kg)
Size: 6.6 x 4.7 x 14.2 inches/17 x 12 x 36 cm (HWD)

ESCORT-LINK DISPLAY EXTENSION CABLE

Length: Provides total of 10 ft separation between video display and base
Cables: Touchscreen and video

ESCORT-LINK ARCHIVE TO ASCII DATABASE PROGRAM

Function: Converts stored vital signs data to ASCII format for use
 in scientific analysis programs

PHYSICAL

Weight: LINK Video display 32 lb (14.5 kg)
 LINK base 30 lb (13.6kg)
Size: LINK Video display 14 x 13.75 x 16.125 inches/35.6 x 34.9 x 41 cm (HWD)
 LINK base 6.25 x 16.35 x 16.75 inches/15.92 x 41.65 x 42.67 cm (HWD)

POWER

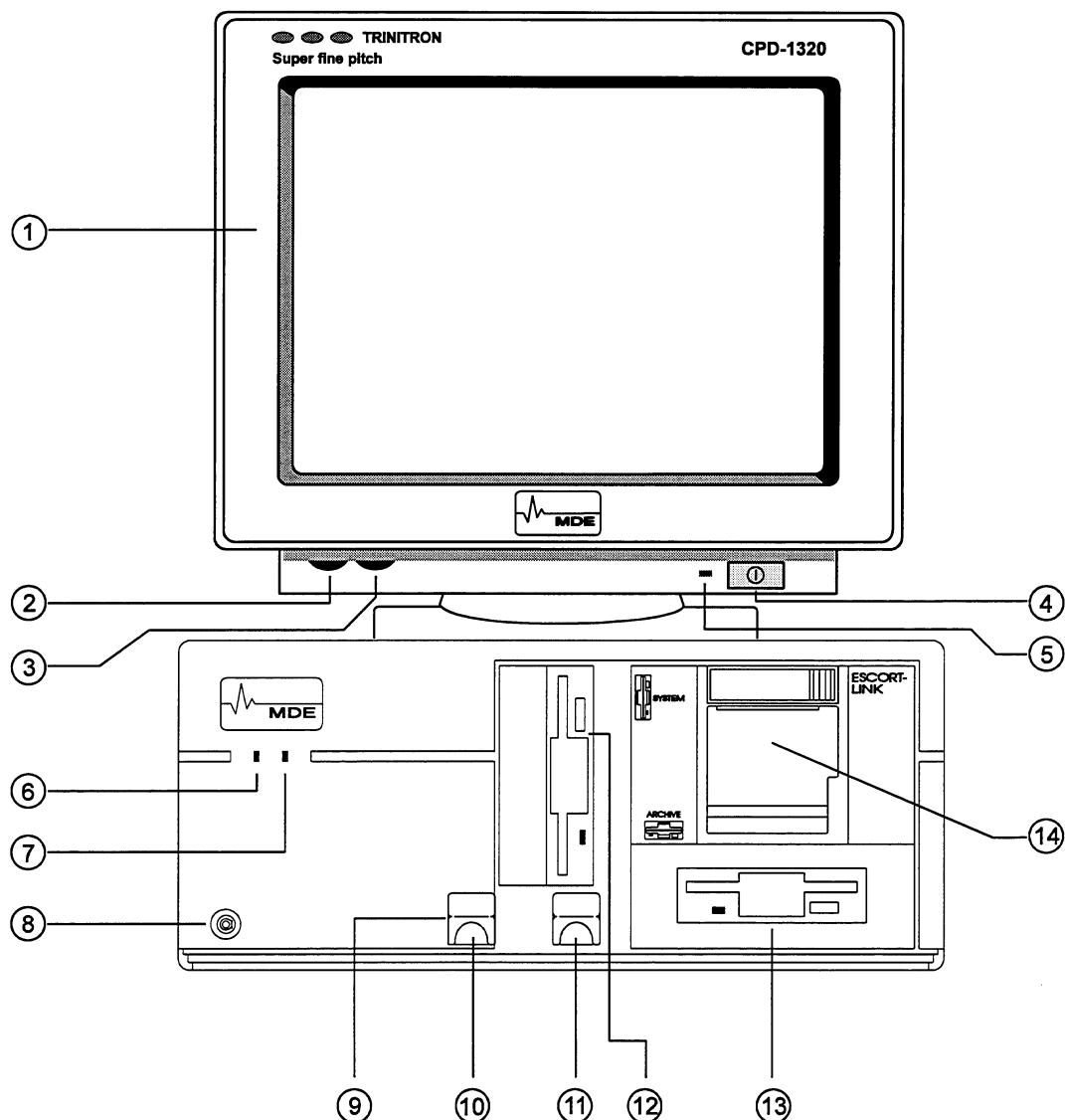
AC Main: 115/230 VAC, 60/50 Hz selectable
Power: 200 watts

ENVIRONMENTAL

Operating Temperature: +10°C to +35°C ambient
Non-Operating Temperature: -40°C to +70°C ambient
Relative Humidity: 85% @ 35°C (operating); 95% @ 35°C (non-operating)



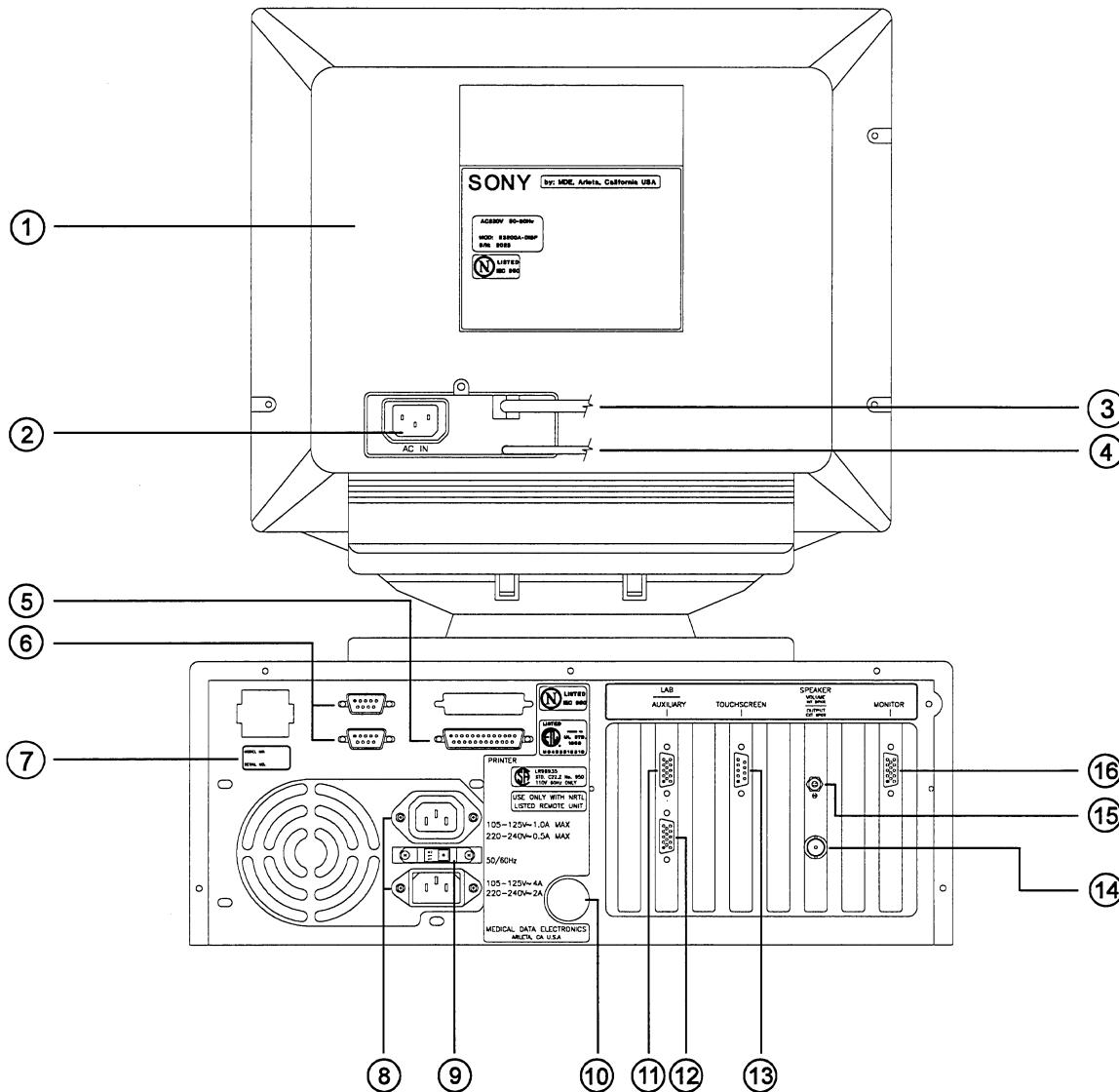
1.3 LINK Central Station - Front View



1. LINK VGA Display	8. System keylock
2. Brightness Adjust/Control	9. Safety cover for Central Station power and reset switches
3. Contrast Adjust/Control	10. Central Station Reset switch
4. LINK Display On/Off switch	11. LINK Base On/Off switch
5. LINK Display power indicator	12. System 3 1/2", 1.44M floppy disk drive
6. LINK Base HDD indicator	13. Archive (optional) 3 1/2", 1.44M floppy disk drive
7. LINK Base power indicator	14. Thermal Array Recorder

Figure 1-4: ESCORT - LINK Central Station - Front View

1.4 LINK Central Station - Rear View



1. LINK VGA Display	9. AC voltage select switch
2. LINK Display AC receptacle	10. Keyboard connector
3. VGA Display cable	11. Smart Hostess Board (LAB) connector
4. Touchscreen cable	12. Smart Hostess Board (Auxiliary) connector
5. Parallel Port (printer) connector	13. Touchscreen controller connector
6. Serial Ports	14. External speaker output connector
7. Model/Serial Number label	15. Internal speaker volume adjust knob
8. LINK Base AC receptacles	16. VGA Controller Board connector

Figure 1-5: ESCORT - LINK Central Station - Rear View



1.5 Warnings & Safety Considerations

WARNING: ONLY qualified technicians possessing specific experience and expertise in the servicing of Biomedical equipment should attempt servicing the ESCORT - LINK Central Station and/or AutoNet Components.

WARNING: HIGH VOLTAGES are present within the ESCORT - LINK Central Station and AutoNet components. Use caution when servicing.

WARNING: Always use an ESD (Electro-Static Discharge) grounding wrist or ankle strap that is properly grounded. Always perform service in an ESD safe environment.

WARNING: When operating the ESCORT - LINK Central Station and/or AutoNet components from an AC power source, the wall receptacle must be a three-wire, grounded, hospital grade outlet. Use only the original hospital grade AC power plug and cord .

WARNING: Do not use in temperatures above 35° C or below 10° C.

WARNING: DO NOT plug unit into multiple outlet power strip to avoid summation of leakage currents.

WARNING: Read this Service Manual in its entirety prior to attempting service on the ESCORT - LINK Central Station and AutoNet components. Refer to the ESCORT II Model 20100 and 20300 Service Manuals for additional servicing information.

2 Installation

2

INSTALLATION

2.1 Unpacking and Inspection

Carefully inspect all the shipping boxes that contain ESCORT - LINK Central Station and associated AutoNet components for damage prior to opening. If any damage is present, or if any doubt exists in regards to the condition of the equipment, notify the carrier immediately.

If any part of the ESCORT - LINK Central Station needs to be returned for any other reason, a Return Material Authorization number (RMA #) should be obtained. To obtain an RMA number, call MDE Technical Support at one of the telephone numbers listed in the front of this manual. It will be necessary to have the model number and serial number of the equipment at hand along with a detailed description of why it needs to be returned.

Note: All units should be returned in their original shipping boxes and packing material.

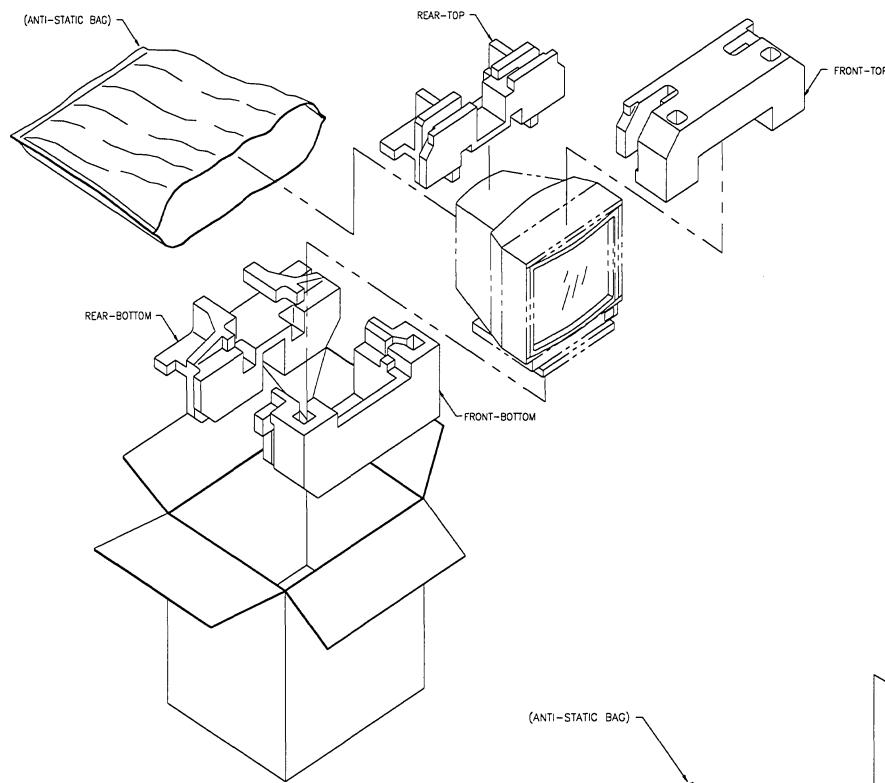


Figure 2-1
LINK Display Packaging

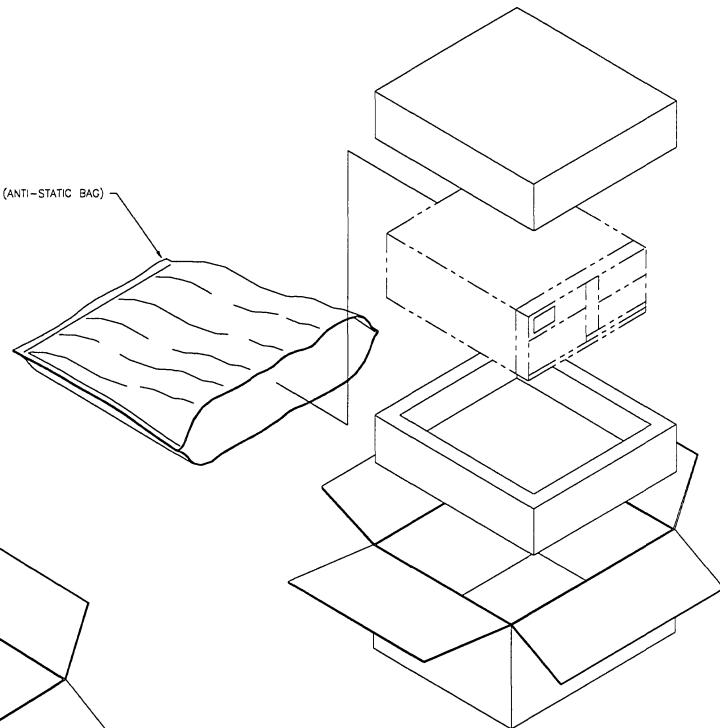
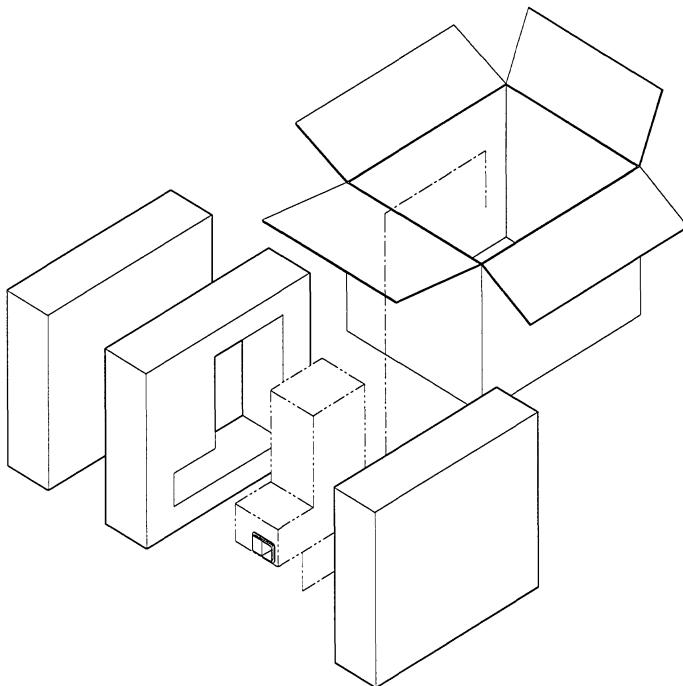


Figure 2-2
LINK Base Packaging



**Figure 2-3: LINK Auxiliary
Base (LAB) Packaging**

2.2 Inventory of Contents

Once you are satisfied with the packages delivered, open each carefully, again inspecting each for damage of any kind. The contents of the LINK Central Station shipment should include, as a minimum, the following:

- An ESCORT - LINK Base with power cord
- An ESCORT - LINK VGA Color Display with Touchscreen installed and power cord
- An ESCORT - LINK AUXILIARY BASE (LAB) with antenna and power cord
- An ESCORT - LINK Transceiver (attached to LAB)
- A LAB/LINK Interface Cable (connects LINK Base to LAB)
- A 3 ½" System Reserve Floppy Disk(s) containing the current software version
- A Touchscreen Cable (connects screen to LINK Base)
- An ESCORT - LINK Operator's Manual
- An ESCORT - LINK Service Manual

Note: *The System Reserve Diskette is ONLY for use in the event of a hard disk drive failure. The System Reserve Diskette does not include Full Disclosure OR Arrhythmia options regardless of whether or not those options are installed on the system hard drive.*

Some system components are discussed briefly below. Refer to Chapter 3, "System Components," for additional information.

2.2.1 LINK Base

The LINK Base houses the System Motherboard accompanied by the Touchscreen Controller, VGA Controller, Smart Hostess, and Recorder Interface boards (PCBAs). A 200MB hard disk drive, system floppy disk drive, and recorder are also installed. The LINK Base functions with a 200 watt switching power supply.

2.2.2 LINK Display

The LINK Display is 13" VGA color display operating at a resolution of 640 x 480 pixels. Additional hardware has been installed at the factory to provide touchscreen capabilities.

2.2.3 LINK Auxiliary Base (LAB)

The LINK Auxiliary Base is the communications interface between the LINK Central Station and the ESCORT II bedside monitors. The LAB provides an external base for the transceiver module which is attached to it when shipped.

2.2.4 Transceiver Module

A transceiver module is installed on the LINK Auxiliary Base (LAB) and each ESCORT II bedside monitor that will be part of the AutoNet Wireless network. Each transceiver has a unique hexadecimal identification number that is recognized by the ESCORT II bedside monitor or Central Station (LAB transceiver) upon installation and start-up.

2.2.5 ESCORT II Bedside Monitor

One (1) to thirty-two (32) ESCORT II bedside monitors will be included in your shipment to complete the AutoNet network. ESCORT II Bedside Monitors provide patient monitoring of various physiological parameters such as ECG, Respiration, Invasive and Noninvasive Blood Pressures, Temperature, SpO₂, and CO₂. When equipped with a Model 20011 transceiver, the ESCORT II monitor becomes part of MDE's AutoNet network with the ability to transmit and receive data from the LINK Central Station.

2.2.6 AutoNet™ Repeater

A Repeater module may be necessary to extend the LINK Central Station's communication range. Repeaters are essentially a stand alone transceiver module, also identified by a four-digit hexadecimal number. The repeater has an AC power module hardwired to its case which converts AC power to a +15VDC output. Repeaters need to be specifically configured at the Central Station to be properly identified and to function correctly. Contact MDE Technical Support if you think your system might need a repeater module.

2.3 Setup

After all Central Station items have been unpacked and inspected, you are ready to set up the system. Ensure that all ESCORT II bedside monitors and repeaters are setup within range specifications.

Locate an area which provides good air circulation and is removed from any electrical interference or extreme temperatures.

Set the LINK Base on a smooth flat surface capable of supporting a total weight of no less than seventy-five pounds (75 lbs.) while providing physical space of 24" x 30" x 30" (HWD). Set the LINK Display on top of the LINK Base. Find a location for the Link Auxiliary Base (LAB) that will remain undisturbed and is within the extension capability of the LAB/LINK interface cable (6 ft.). See Figure 2-4 for an illustration of the typical LINK Central Station setup.

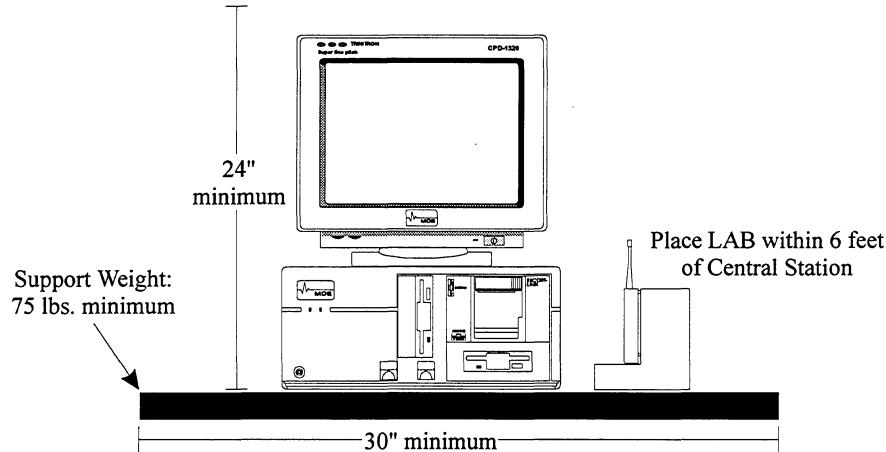


Figure 2-4: LINK Central Station Site Requirements

2.3.1 Signal and Power Connections

The following signal and power connections must be made prior to booting the system. Refer to Figure 1-3 (Central Station - Rear View) in Chapter 1 for connector location.

- Ensure that the AC power switches located on the LINK Base, LINK Display, and LAB are all turned OFF before proceeding.
- Connect the LINK/LAB Interface Cable to the LAB (J2, DB-9) and to the Smart Hostess board connector, which is located on the rear panel of the LINK Base (J1, DB-15 (top connector)). Secure all screws.
- Connect the VGA display cable to the VGA Controller board connector, which is located on the rear panel of the LINK Base (J2, DB-15). Secure screws.

- Connect the Touchscreen cable (male end) to the Touchscreen board connector, which is located on the rear panel of the LINK Base (J1, DB-9). Connect the other end of the Touchscreen cable (female end) to the connector on the rear of the LINK Display (DB-9). Secure screws.
- Connect AC power cord to LINK Display. Connect to AC outlet or source.
- Connect AC power cord to LINK Base. Connect to AC outlet or source.
- Connect AC power cord to LAB. Connect to AC outlet or source.

2.3.2 System Start-up

- Turn ON AC power to LAB, LINK Display, and LINK Base.
- When the system boots up, you will be prompted to perform a touchscreen calibration. Respond by touching the screen and following the on-screen commands.
- Upon completion of the touchscreen calibration procedure, the system will reboot.
- Prepare a node list (photocopy and use Figure 2-8) which includes each ESCORT II bedside monitor and repeater that will be used by the Central Station, be sure to determine the hexadecimal identification number of each bedside transceiver (see note below) and make note the monitor's location.

Note: The ESCORT II Transceiver hexadecimal identification number may be determined by viewing the ID # label on the transceiver case. If the ID # label is not visible, the number may be viewed on the ESCORT II screen by performing the following steps:

Procedure for determining ESCORT II Bedside Monitor Hex ID Number

- Turn ON power to ESCORT II monitor
- Press PAGE HOME to ensure that monitor is set to its Home Page.
- Press NEXT PAGE two (2) times.
- Press TEST (center key).
- Press SW STAT INFO two (2) times. This should display NETWORK STATUS at the top of the screen.
- The second line of text from the top of the screen should read:
RF TRANSPONDER **32DC***

***Note: Hexadecimal number shown for reference only, your ESCORT II monitor will have its own identification number**



- Confirm that your node list is generated in the LINK Central Station by accessing system configuration information and viewing nodes. (refer to Appendix C for configuration instructions).
- If your Central Station needs to be configured, do so at this time (again, refer to Appendix C for configuration instructions).

2.4 Establishing Communications

- After the system has been operating for approximately two minutes, access the Central Station “Power Levels” page (see Figure 2-6). The Power Levels page may be accessed through the “System Setup” menu. From the main screen, perform the following steps:

Press ***NEXT PAGE***

Press ***SYSTEM SETUP***

Press ***POWER LEVELS***

For more information on the system Power Levels page, see Chapter 4, “Theory of Operation.”

- The Central Station's operating channel may be viewed on the Power Levels page and should be determined at this time. Look to the bottom left corner of the screen for FREQ: *X*. A value (1 - 7) should be displayed for *X*, this is the Central Station operating channel. Log the operating channel in your node list for future reference. Refer to Chapter 4, “Theory of Operation,” for instructions on setting or changing the Central Station operating frequency. The optimum Central Station channel has already been determined by Medical Data Electronics for your establishment and has been set at the factory prior to shipment.
- Verify that the operating channel of each bedside has been set to the same channel as the Central Station or set to *AUTO* mode. If the frequency is not set to the Central Station's, and you wish to operate in Fixed Frequency mode, set at this time. This is accomplished through the ESCORT II bedside monitor configuration. Refer to Chapter 4, “Theory of Operation,” for instructions on setting or changing the ESCORT II bedside monitor's operating mode and/or channel.
- Return to the Central Station Power Levels page and check to see if each node (ES-CORT II bedside monitor or Repeater) is listed in the leftmost column (*NAME*). Each repeater will be identified with (REP) following the user assigned name. If a patient has been admitted and is being monitored by the Central Station, the name entered when admitted will follow the bedside name (e.g., MON1/Smith, B.).

- Communications to each node may be verified if *Success Rate*, *Loading*, and *HOP1* columns show activity (i.e., green status bar) for that node. *HOP2*, *HOP3*, and *HOP4* columns may also show activity for multiple hop communication. Absence of any activity means that communications have not been established. In the event that communication to any node fails, recheck all configuration settings. If no configuration discrepancies are discovered, and communications have still not been achieved, contact MDE Technical Support for assistance.

Note: *A hop is characterized as any node in the communication path including the destination node.*

- Further verification of adequate communications may be confirmed at the ESCORT II bedside monitor. Access the bedside Network Status page (as described previously in this chapter, see paragraph 2.6.2). The Central Station transceiver (transponder) should be identified with its hexadecimal identification number displayed. The Central Station operating channel and number of hops will also be displayed if good communications exist. Figure 2-5 displays the ESCORT II Network Status Page.
- Figure 2-7 displays the Central Station main screen with communications established and patient monitoring in progress. The appearance of the Central Station main screen will vary depending on your configuration.

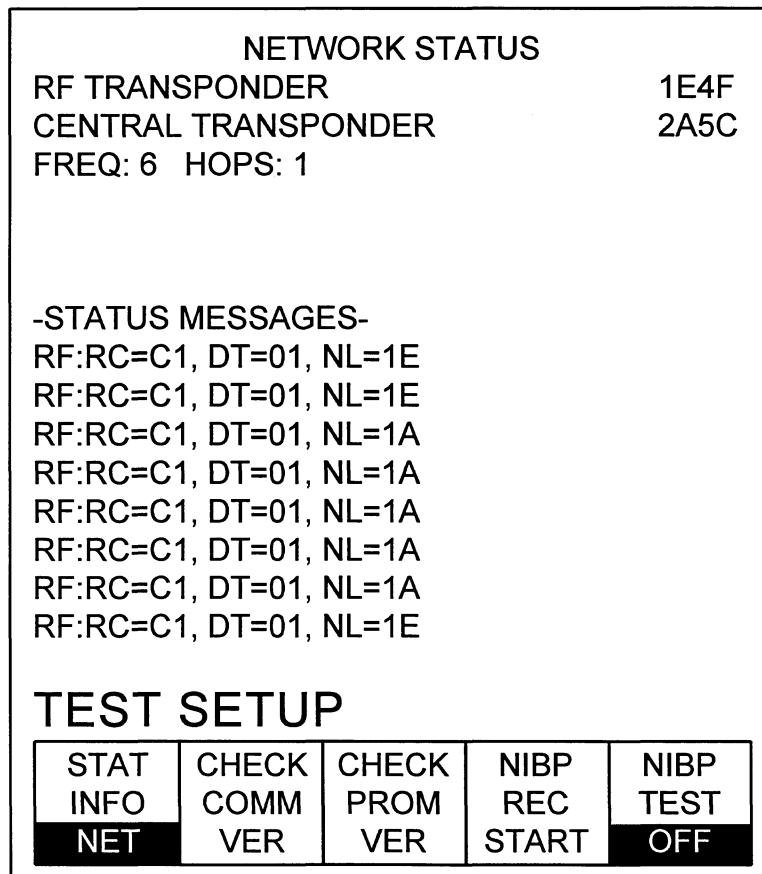


Figure 2-5: ESCORT II Bedside Monitor - Network Status Page



POWER LEVELS									
SUCCESS									
NAME	RATE	LOADING	HOP1	HOP2	HOP3	HOP4			
MON1/	[Solid Black]		36AC	52AB					
MON2/	[Solid Black]		36AC	116F					
MON3/	[Solid Black]		36AC	234A					
MON4/	[Solid Black]		36AC	234A	25BA				
MON5/	[Solid Black]		36AC	234A	25BA		42E6		
MON6/	[Solid Black]		36AC	7771					
MON7/	[Solid Black]		36AC	7771	3DDA				
MON8/	[Solid Black]		36AC	7771	3DDA	89BC			
NOT ASSIGNED									
NOT ASSIGNED									
NOT ASSIGNED									
NOT ASSIGNED									
NOT ASSIGNED									
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NOT ASSIGNED									
FREQ: 6	NOISE LEVEL	[Solid Black]	SYSTEM LOADING	[Solid Black]					
Main Ver: 3.0.0.0 50/60Hz	Hostess Ver: 3.0.0.0								
Local Transponder Ver: 01.00.00.00	LAB Ver: 01.00.00.00								

Figure 2-6: Central Station Power Levels Page

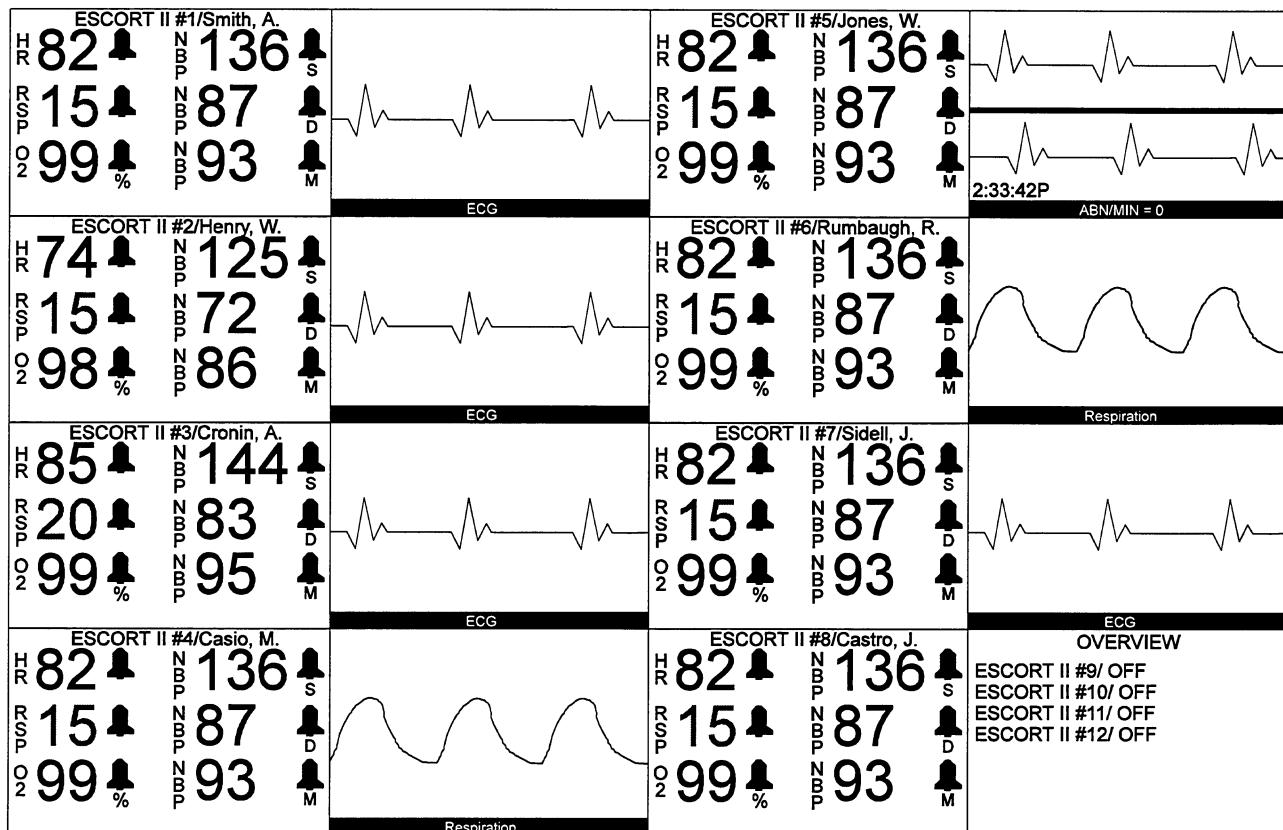


Figure 2-7: Central Station Main Screen



ESCORT - LINK Model 3200B
Node List
Central Station S/N

Central Station Operating Channel (circle one): 1 2 3 4 5 6 7

LINK Auxiliary Base (LAB) Transceiver ID #: _____

Figure 2-8: ESCORT - LINK Model 3200B Node List

3

System
Components

3

SYSTEM COMPONENTS

3.1 System Components

3.1.1 Overview

The LINK Model 3200B Central Station network includes the LINK Base, a VGA color display (with touchscreen capability installed), a LINK Auxiliary Base (LAB), an antenna, and from one to thirty-two ESCORT bedside monitors. All associated signal and power cables are included. The LINK Base houses an Intel 486DX-33 based motherboard with onboard RAM, ROM, and I/O. Also within the LINK Base is a 3 ½", 1.44 Mbyte floppy disk drive, a 200 Mbyte IDE hard disk drive (with LINK software installed), and a thermal array recorder. A 200 watt power supply is installed and is equipped with a secondary cooling fan providing ample power and cooling for all ESCORT - LINK base system components.

Other LINK options such as a laser printer or archive disk drive may be included with shipment if purchased. For information about LINK options, see Chapter 7 "LINK Options." An Uninterruptible Power Supply (UPS) may also be included to provide battery backup to the LINK Central Station and LAB in the event of an AC power outage.

3.1.2 LINK Display

The LINK Display is a 13" VGA color display running at a resolution of 640 x 480 pixels. The display is a Sony Model CPD-1320 (or equivalent), that has had additional hardware installed at MDE's factory to provide touchscreen capabilities. Up to sixteen screen tiles (numeric, waveform, or overview) may be displayed at a given time.

3.1.3 LINK Base - System Motherboard

The LINK System Motherboard operates with an Intel 486DX-33 Central Processing Unit (CPU), 8 Mbytes RAM, 128 KBytes of cache memory, seven expansion slots (4 used, 3 unused). All I/O (Input/Output) control operations are onboard; this includes floppy disk drive control, IDE hard disk drive control, one (1) parallel port, and two (2) serial ports.

The motherboard layout may be viewed in Figure 3-1.

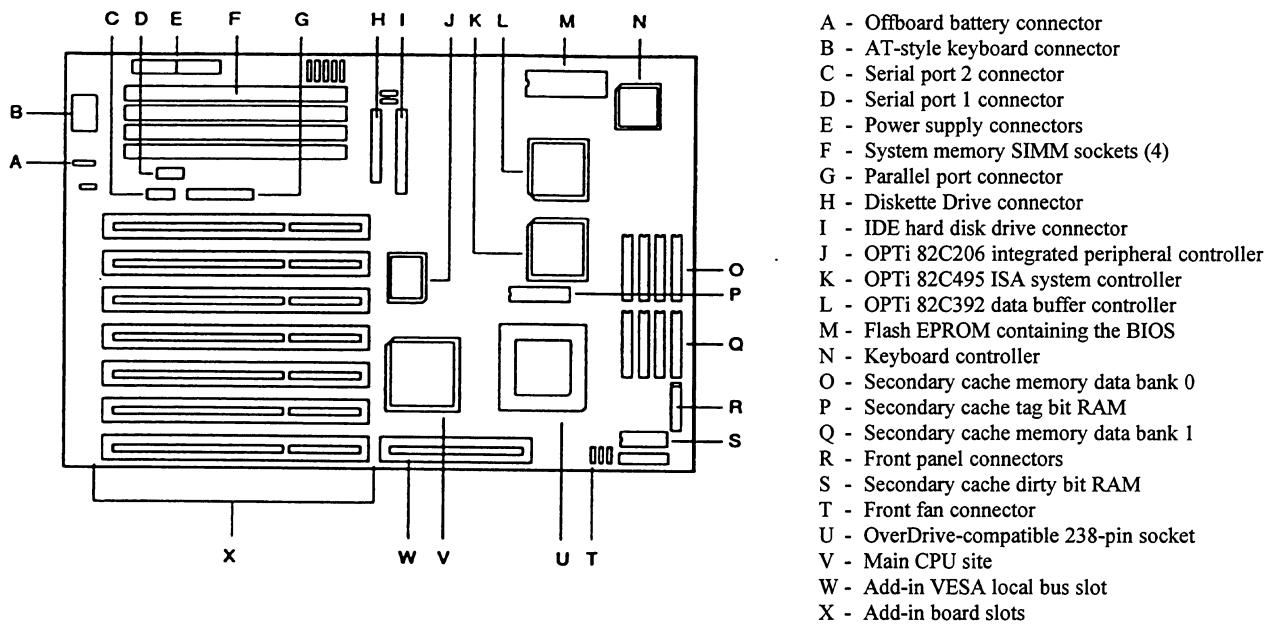


Figure 3-1: LINK 3200B System Motherboard

3.1.3.1 System Memory

The memory subsystem consists of four logical banks, each containing one 36-bit SIMM socket. The ESCORT - LINK Central Station's standard factory setup is 8 Mbytes of RAM. Two SIMMs (1MB x 36 = 4MB actual RAM each) are installed in memory banks 0 (U5) and 1 (U12).

3.1.3.2 System I/O

Two serial ports, a parallel port, floppy and hard disk drive interface are incorporated onto the system motherboard in a single device, a PC87311AVF and is accessible through onboard connectors.

3.1.3.3 System Chipset

The motherboard utilizes a *three chip* configuration for system control. The OPTi chipset used consists of an 82C495 System Controller, an 82C206 Integrated Peripheral Controller, and an 82C392 Buffer Controller.

3.1.3.4 Real-Time Clock, Battery-Backed CMOS RAM, and Battery

A real-time clock (RTC) and battery-backed CMOS RAM are contained within the OPTi 82C206. This produces a clock with an accuracy of twelve minutes per year (12min/yr). Battery backup is supplied by a 4.5 volt alkaline battery which is attached to the inside of the PC chassis. Expected life of the battery is three years. A replacement battery rated at 3.6V, 4.5V, or 6.0V may be used. Connection to the battery is accomplished with the connector at J17.

3.1.4 VGA Interface Card

The VGA card is a memory mapped interface connected between the CPU motherboard and LINK display screen. The VGA card is set to operate the LINK display at a resolution of 640 X 480 pixels.

3.1.5 Touchscreen & Touchscreen Interface Card

The LINK touchscreen uses Surface Acoustic Wave technology (SAW), with up to 100 touch points per square inch. When a touch occurs, the finger absorbs a portion of the energy flowing in the X and Y directions which results in attenuating the two signals. By comparing the speed of the these signals, the touchscreen interface card can calculate the exact touch location.

The touchscreen interface card is interrupt driven to insure all touched data is captured. The X and Y coordinates of the touchscreen are scanned for an intersection. When the screen has been touched, it sends the coordinate information to the CPU.

The touchscreen interface card also includes the capability of selecting information with an “untouch” command. This allows the user to select options requiring a screen key first be touched then released after some period of time.

Calibration for the touchscreen is stored in the ESCORT - LINK System software. Each time the system is booted up, the user is given the opportunity to calibrate the touchscreen. The touchscreen calibration procedure takes only a few moments to complete. Touchscreen calibration should be performed during the initial setup of the system, any time the system is moved, when any part of the LINK base or display has been replaced, or any time the user questions the accuracy of the calibration.

Touchscreen calibration should be performed when facing the LINK display at the most commonly used viewing angle. This will minimize parallax errors when using the system.

3.1.6 Smart Hostess Board

The Smart Hostess Board serves as a communications interface and buffer between the transceiver located on the LINK Auxiliary Base (LAB) and the CPU on the LINK base motherboard. The CPU resets the Smart Hostess then loads the program into the Hostess' memory. The Smart Hostess then initiates the transceiver for communication with the CPU.

3.1.7 Recorder Interface & Watchdog Timer Board

The Recorder Interface board gets recorder data from the LINK base CPU and converts it to an X, Y, and Z format that is then printed on the recorder strip. Time of day, month, year, alarm record or manual record as well as waveforms and parameters are documented on the strip. Operating voltages and data for the recorder travel through the 50 conductor ribbon cable connected between the recorder interface and recorder.

The Watchdog Timer circuit on the board insures that the LINK Central Station does not sit in an inactive state. When the system is started, or restarted, the watchdog allows five minutes of inactivity before initiating a system reset. After power up, the watchdog interval reduces to a thirty second surveillance time.

3.1.8 Power Supply

The power supply used in the LINK base is a 200 watt switchable supply capable of handling all onboard resources, add-in cards, and peripherals. The supply supports operating settings at 100-120 VAC (5 Amps AC) or 200-240 VAC (3 Amps AC). The input voltage is selectable by using a switch on the back of the LINK base. Refer to the tables below for information on the power supply's AC input and DC output specifications.

**Table 3-1: Power Supply AC Input Specifications 50/60 Hz**

AC Voltage	Current
90 to 135	5.0 A
180 to 265	3.0 A

Table 3-2: Power Supply DC Output Specifications

DC Voltage	Maximum Continuous Current	Peak Current 15 Seconds	Minimum Current Load
+5 V	22.0 A	-	3.0 A
-5 V	0.5 A	-	0 A
+12 V	8.0 A	9.0 A	0 A
-12 V	0.5 A	-	0 A

3.2 Transceiver Module (Model 20011)

Each bedside included in the AutoNet network must be equipped with a transceiver module. The LINK Central Station includes a transceiver which is mounted on the LINK Auxiliary Base. The transceiver module provides fifty milliwatts (50 mW) of signal power for communications, and is identified by a four-digit hexadecimal number which is embedded within its hardware. The Central Station uses this identification number to communicate with each node (i.e., bedsides and repeaters). See Chapter 4, “Theory of Operation,” for additional discussion on the transceiver module.

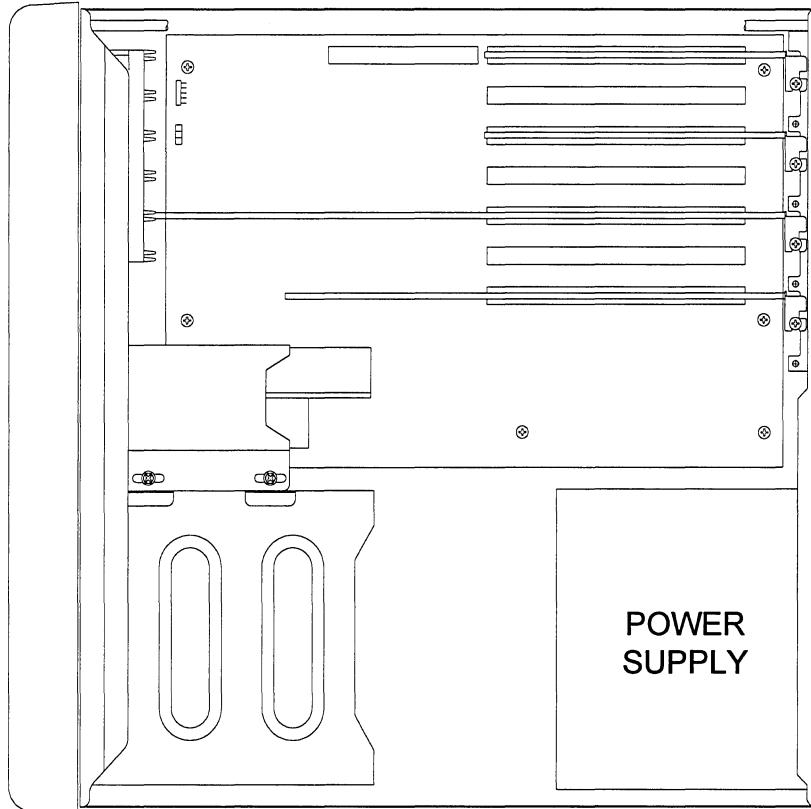
3.3 LINK Auxiliary Base (LAB) (Model 20010)

The LINK Auxiliary Base, or *LAB*, is used as the interface for communications between the ESCORT - LINK Central Station and the ESCORT II Bedside Monitors. The LAB provides an external base for the transceiver module while routing all necessary power and operating signals to it. All communication between the Central Station and the ESCORT II Bedside Monitors must pass through the LAB.

The AutoNet network requires a LAB and a transceiver regardless of whether it is to be used for a simple configuration with one or two bedsides or if it will be used in an environment with multiple bedside monitors. The LAB connects to the Central Station via the LAB/LINK interface cable and is set in close vicinity (within six feet) to the Central Station. See Chapter 4, “Theory of Operation,” for additional discussion on the LINK Auxiliary Base.

3.4 Board Location

Refer to Figure 3-2, below, for the location of LINK system boards. Read and follow the instructions found in Chapter 6, “Mechanical Disassembly,” when opening the LINK Base.



1. VGA CONTROLLER
2. BLANK
3. RCDR INTERFACE/WCHDOG
4. BLANK
5. TOUCHSCREEN
6. BLANK
7. SMART HOSTESS
8. BLANK

Figure 3-2: LINK Base - System board location



3.5 Interconnection Diagram

Figure 3-3 displays all standard and optional system components and their system connection. Front panel and rear panel areas are clearly indicated. LINK system board connections and external connectors are also displayed.

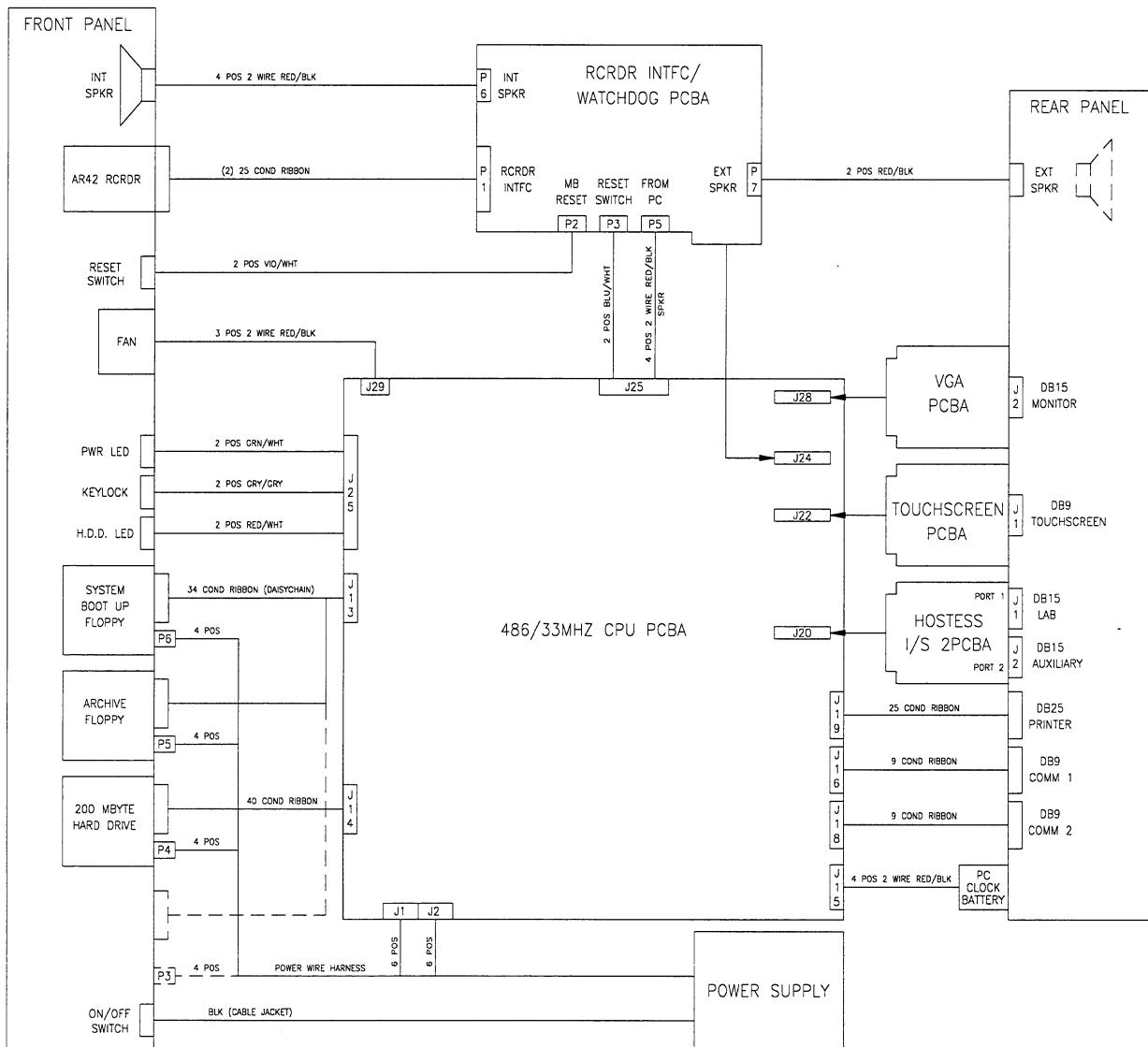


Figure 3-3: LINK Model 3200B Central Station Interconnection Diagram

4

Theory of Operation



THEORY OF OPERATION

4.1 Overview

The ESCORT - LINK Central Station and associated AutoNet components form a wireless network in which patient information is communicated between the Central Station and any ESCORT II bedside monitors assigned in the network. All ESCORT II bedside monitors assigned in the network must be equipped with the Model 20011 transceiver module.

The Central Station utilizes spread spectrum communications technology in an operating bandwidth of 902 - 928 MHz.

This chapter explains the communication technique used by the AutoNet wireless network and describes its functionality. The system Power Levels page, which provides quick and detailed status of the network is described in detail. Network operation of the ESCORT II bedside monitors is also discussed. Finally, the transceiver module and LINK Auxiliary Base (LAB) are described.

4.2 Communications

Communications in the network is based on an OSI (Open Systems Interconnection) model. The OSI model is a layered architecture where levels of service and types of interaction are standardized over the network for the purpose of exchanging information.

The standard OSI model separates communications into seven layers. The ESCORT - LINK Central Station modifies this standard scheme, utilizing just four layers.

4.2.1 Layered Architecture

The four layers used are the Application Layer, Transport Layer, Network Layer, and Physical Layer. The layers are defined as follows and presented in Figure 4-1.

Application Layer - The Application Layer contains the actual data itself and provides services to the network users at an application-based level. It is the highest level of the OSI model. It relies on services performed at lower levels, and is the layer least involved with the underlying network hardware.

Transport Layer - The Transport Layer is responsible for both quality of service and accurate delivery of data. Error detection and correction are performed at the Transport Layer.

Network Layer - The Network Layer ensures that data arrives at its intended destination. The Network Layer is in charge of deciding how to get data from point to point. Moreover, its function is to establish, maintain, and keep open a path on which the data can travel.

Physical Layer - The Physical Layer is the first and lowest layer, and is totally hardware oriented. It deals with all aspects of establishing and maintaining a physical link between communicating nodes. Actual transmissions and data encoding are executed at the Physical Layer.



Within this layered system, each layer may only communicate with its adjacent layer and to its piers. For example, the Transport Layer of the Central Station may exchange information directly with its own Application or Network Layers (adjacent layers) or with an ESCORT II bedside monitor's Transport Layer (pier).

Anywhere that two entities (layers) communicate with each other, a protocol revision exists. The Central Station software checks all protocol combinations in use and determines if any discrepancies (protocol revisions not equal) exist. If any discrepancies do exist, communication to that node is shut down and will not be possible until the protocol revisions match.

The Central Station Protocol Revisions page is presented in Figure 4-2. Here, all protocols in use by the system and their compatibility may be viewed. The protocols listed will vary depending upon the configuration of your Central Station and the components in use by the network. See the section, “LINK Central Station Diagnostic Screens,” in Chapter 5 for additional information on the Protocol Revisions page.

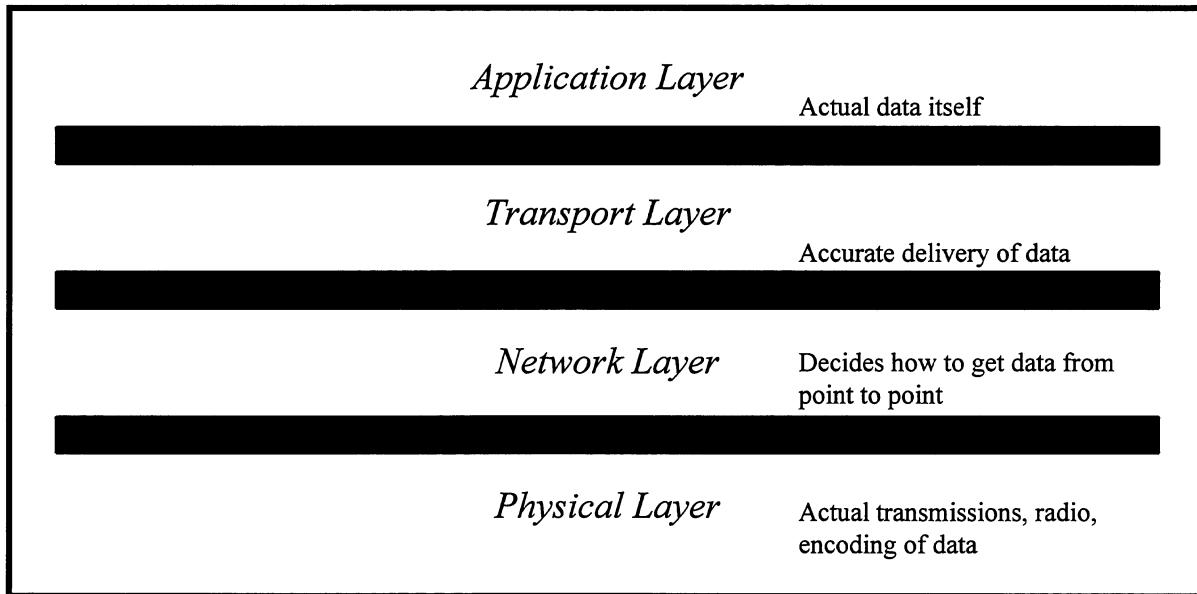


Figure 4-1: ESCORT - LINK Layered Communication Architecture

PROTOCOL			
	LAB	TRANS	HOST
Board Type	14	09	11
ECGALP			
RESPALP			
SAO2ALP			
BPALP			
TEMPALP			
NIBPALP			
COALP			
CO2ALP			
TELMALP	01		
ALLALP	01	01	
TBLPRLP	01	01	01
HCNLP	03	03	03
DBUSPLP	02	02	
TABLALP	03		
RFPRLP		02	02
RFXLP	04	04	04
RFNLP	01	01	01
RFPLP		01	
IRNLP			
IRPLP			
HTLNLP	02	02	02
SDLCPLP	01	01	01
HOSTALP			06

	EXIT
--	------

Figure 4-2: Central Station Protocol Revisions Page



4.2.2 System Power Levels

The Central Station software provides access to information on system mapping, frequency channel setting, communications software version(s), system loading, and system noise level on a single diagnostic screen called the Power Levels page. The Power Levels page may be viewed in Figure 4-3. The items identified are described as follows:

1. NAME

This column accommodates the name assigned to the bedside monitor or repeater and the admitted patient's name. A typical entry might be: MON1/Smith, W.. In this example, the ESCORT II bedside monitor has been assigned in the system as MON1 and W. Smith is the patient being monitored by the ESCORT II.

2. SUCCESS RATE

The success rate is a representation of the ratio of transmission tries to transmission successes.

3. LOADING

This is a representation of the loading at the bedside (node). The size of the bar will increase in respect to the amount of information being transmitted. An ESCORT II monitoring several parameters and waveforms will display a high amount of loading, where a bedside only monitoring ECG will display a low amount of loading.

4. HOP1

The Hop 1 column displays communication status between the Central Station and some other node. All communications between the Central Station and surrounding nodes must include at least one hop. The status bars presented in the HOP1 column are directional. The top bar reports communications from the Central Station to the node. The bottom bar reports on the return transmission. The four-digit hexadecimal number listed in the column between the LOADING column and the HOP1 column is the identification number of the Central Station transceiver located on the LINK Auxiliary Base.

5. HOP2, HOP3, HOP4

These columns represent node to node communications. For any given monitor, the last node listed (highest number of hops) is the destination node. All other nodes listed in the path are acting as repeaters to get the data from the destination node to the Central Station. MON5/ is outlined to explain the hopping sequence. MON5/ is identified by the four-digit hexadecimal number 42E6. Communications from the Central Station to MON5/ is derived from the Power Levels page. We find that the Central Station (36AC) communicates with MON5/ by hopping through 234A and 25BA. MON5/ (42E6) returns communications taking the same route back (i.e., 25BA and 234A). All status bars are directional as indicated.

6. FREQ: X

This is the current frequency channel setting for Central Station communications. The Central Station operating frequency channel may be changed to any of seven operating channels. The seven channels represent equal portions of the 902 - 928 MHz bandwidth.

7. NOISE LEVEL

This is a representation of the overall system noise level. This number should remain below fifty percent for adequate system communications.

8. SYSTEM LOADING

This represents the total amount of work (loading) being performed by the Central Station. Moreover, it displays the quantity of the system's five hundred millisecond RF cycle currently in use. For example, a system with three or four monitors would produce a low level of system loading where a system with thirty bedsides would produce a higher level of system loading.

9. SOFTWARE VERSIONS

The displayed software version numbers serve a twofold purpose. First, the mere presence of any version number confirms that the Central Station is at least aware of that particular device. Second, it may be necessary to have these software version numbers available when contacting MDE Technical Support.

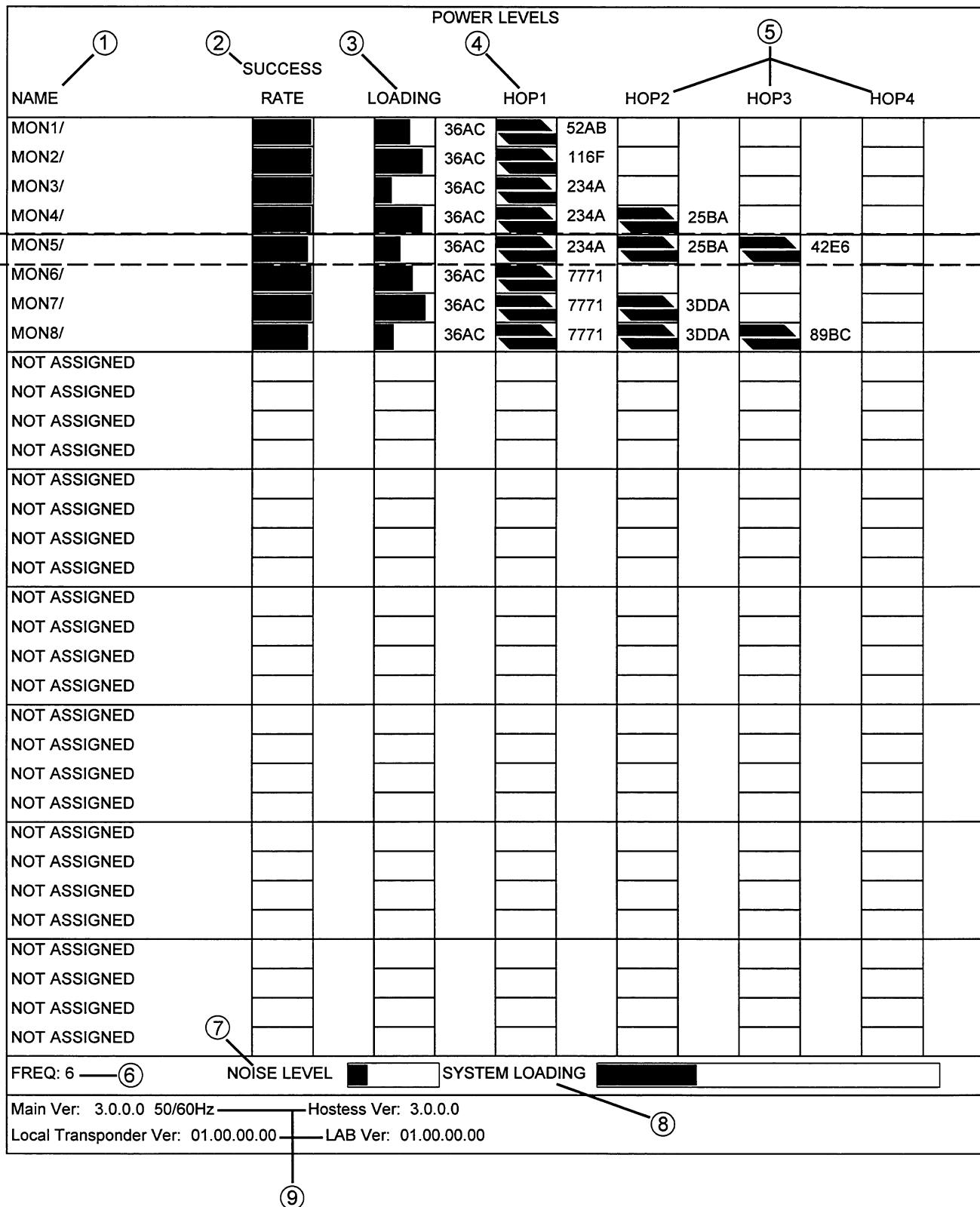


Figure 4-3: Central Station Power Levels Page



4.2.3 ESCORT II Bedside Monitors

All ESCORT II bedside monitors must be located within the operating ranges stated in Chapter 1 of this manual. If the system has been configured for extended range, either a repeater(s) and/or an antenna system will be included.

Each bedside monitor must be set for either *fixed frequency* or *auto search frequency*. Each of these frequency modes are discussed in the following paragraphs.

4.2.3.1 Fixed Frequency Operation

An ESCORT II bedside monitor operating in *fixed frequency* mode has been specifically set to communicate on one of the seven (7) LINK Central Station operating frequency channels. This mode offers direct communication over a known channel and is ideal when the ESCORT II monitor is dedicated to a single Central Station. Since the Central Station only operates under a defined user-selectable channel (1 through 7), setting the bedside monitor to the same channel offers streamlined communications without delays caused by frequency search.

Set the ESCORT II bedside monitor to a fixed frequency by accessing the monitor's configuration menu and modifying the power-up defaults. This may be accomplished by performing the following steps on the ESCORT II bedside monitor:

- Press **PAGE HOME** to ensure that the ESCORT II monitor displays the home page
- Press **NEXT PAGE**
- Press **CONF** to enter monitor's configuration
- When prompted "Are you sure?", respond by pressing **YES**
- Press **SETUP**
- When prompted "Are you sure?", respond by pressing **YES**
- Press **NEXT PAGE**
- Press the **BAND** softkey until the desired channel is highlighted
- Press **PAGE HOME** to return to the home page and save settings

4.2.3.2 Auto Search Frequency Operation

An ESCORT II bedside monitor operating in *auto search frequency* mode will scan all seven Central Station channels either in direct sequence or by following a specific algorithm that searches each channel while attempting to lock on to a *remembered* channel. The ESCORT II may be set to operate in auto search mode by following the instructions listed in paragraph 4.2.3.1 and selecting AUTO.

Note: The ESCORT II's factory default for frequency mode is set to AUTO.



4.2.4 Central Station Operating Channel

The Central Station executes all communications on one of seven (7) operating frequency channels. These seven channels are equal divisions of the operating bandwidth (902 - 928 MHz) and are numbered at the Central Station 1 through 7.

The Central Station operating channel for your establishment has already been determined by Medical Data Electronics and has been set at the factory prior to shipment. The Central Station *Operating Channel* configuration screen may be viewed in Figure 4-4. The operating channel may be set or changed by performing the following procedure.

1. From the main screen, press **NEXT PAGE**
2. Press **SYSTEM SETUP**
3. Press **CONFIGURE SYSTEM**
4. Press and hold **YES** for a minimum of five (5) seconds, then release
5. Press **CONFIGURE NODES**
6. Press **XPONDER FREQUENCY**
7. Select desired operating channel (Note: *Current Transponder Frequency* will not update on the screen until the operator has left this screen and returned)
8. Press **SAVE AND EXIT**
9. Press **YES** to confirm changes
10. Press **EXIT** twice, the Central Station will reset (the new operating channel will now be active)

TRANSPONDER CHANNEL SELECTION						
Current Transponder Frequency 6						
1	2	3	4	5	6	7
Select desired transponder frequency					CANCEL	SAVE AND EXIT

Figure 4-4: Central Station Operating Channel

4.3 Transceiver Module

A Transceiver module is attached to the LAB (for use by the Central Station) and to each ESCORT II bedside monitor included in the AutoNet wireless network. The transceiver module is equipped with a spread spectrum radio which operates within a frequency range of 902 - 928 MHz. The transceiver is identified by a 4-digit hexadecimal number which is embedded in its hardware. This identification number ensures accurate data communications.

The transceiver module may be powered by any of three sources, each providing a means of maintaining communications reliability. The first power source available to the transceiver is a regulated +15VDC which is available when the ESCORT II bedside monitor is either operating under AC *or* battery power. This is the normal operating mode for the ESCORT II and the transceiver. A second method of supplying power to the transceiver is used when the bedside monitor is plugged into an AC outlet (source), but in *STANDBY* mode. This method allows the transceiver to be used by the Central Station as a repeater even though the ESCORT II bedside monitor is currently out of use. Finally, the transceiver is equipped with an on-board battery pack which supplies approximately 10 - 13 seconds of power. The battery pack allows the transceiver an opportunity to notify the Central Station (and all other communicating nodes) that it is going off the air. The ability to keep the Central Station apprised of individual node status improves system efficiency and streamlines system mapping.

4.4 LINK Auxiliary Base (LAB)

The LINK Auxiliary Base (LAB) is the interface between the Central Station and the ESCORT II bedside monitors. It provides an external base for the transceiver module. The LAB routes all data to and from the Central Station through the LAB/LINK Interface Cable (P/N 402078-0000, see Figure 4-5).

Within the LAB are the CPU board (P/N 401792-0000), a Serial I/O controller board (P/N 401794-0000), and a Power Supply board (P/N 401796-0000). All Central Station asynchronous communications are processed by, and routed through the LAB. The 4-digit hexadecimal identification number of the LAB's transceiver module is the identification code for the Central Station. Figure 4-6 displays an interconnection diagram of the LINK Auxiliary Base.

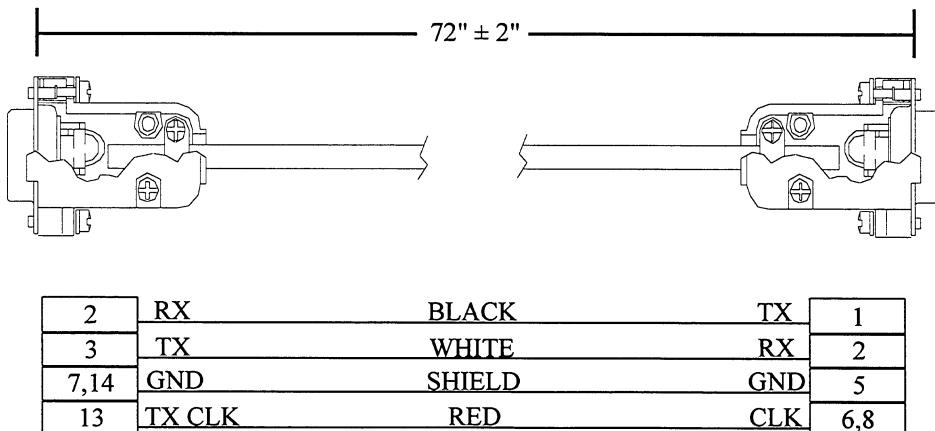


Figure 4-5: Central Station LAB/LINK Interface Cable

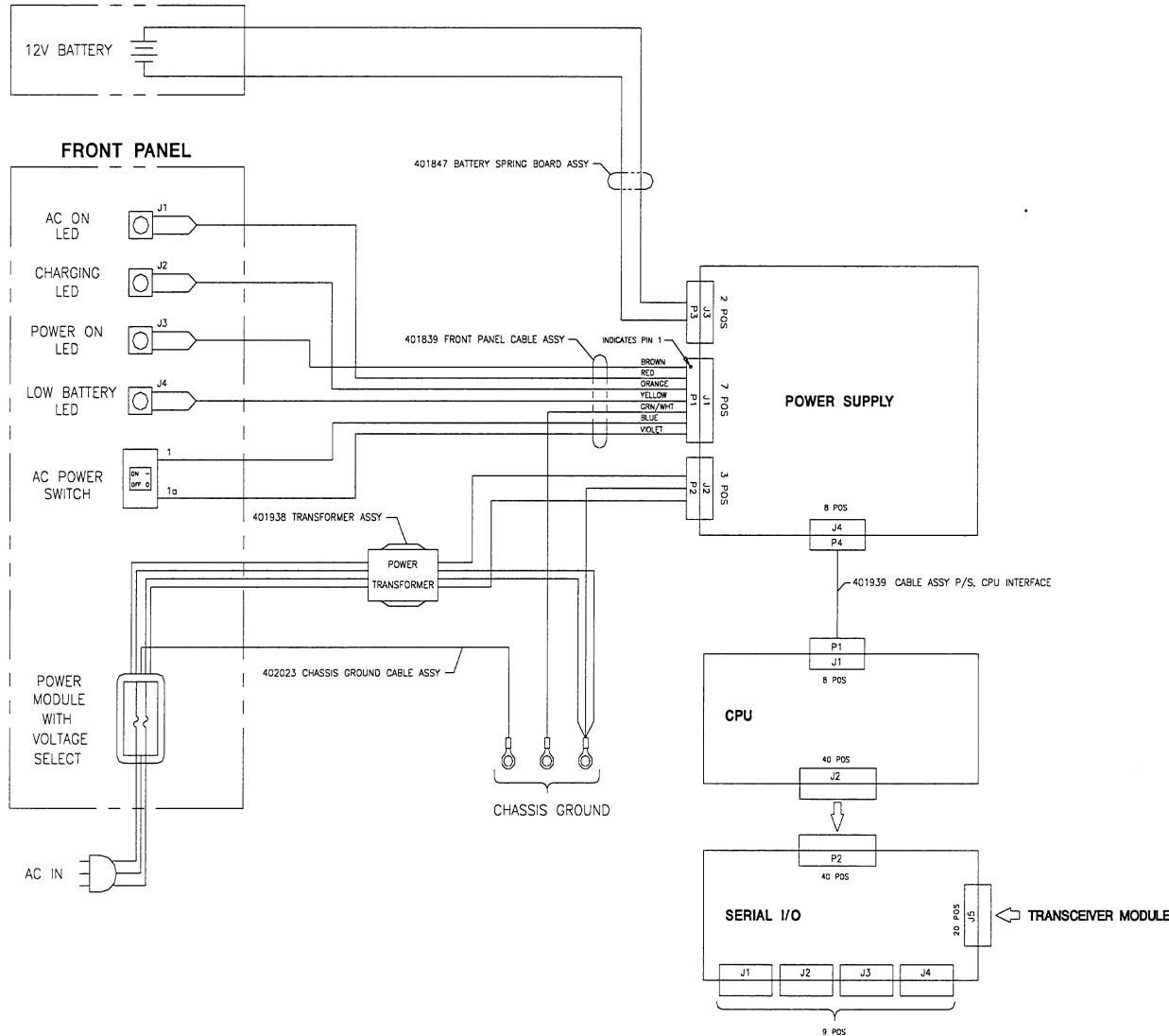


Figure 4-6: LINK Auxiliary Base Interconnection Diagram

5

Troubleshooting

5

TROUBLESHOOTING

5.1 Troubleshooting

WARNING: Only qualified service personnel are to attempt the following troubleshooting instructions. Perform all work at an ESD safe workbench. Perform all work while wearing a grounding wrist or ankle strap.

Consult this section when experiencing difficulties with your ESCORT - LINK Central Station and/or AutoNet components. In many instances, the information needed to recover from system problems will be available here. Key areas discussed in this chapter are:

- No Display/Display blank
- Central Station (LINK Base) does not boot up
- "No Comm"/Communication errors
- Recorder errors
- Touchscreen errors
- Arrhythmia Errors

Various ESCORT II bedside and Central Station diagnostic screens may be referenced within the troubleshooting instructions. All of these screens, and others are presented and described at the end of this chapter.

Medical Data Electronics provides 24-hour technical support and should be contacted in the event that a problem still persists after attempting the ensuing troubleshooting instructions. An MDE Technical Support Specialist will be able to provide additional help in determining system problems and, if necessary, supply shipping instructions should the equipment need to be returned to the factory. All returned equipment must be issued a Return Material Authorization number (RMA #) prior to shipment. An RMA number may be obtained from MDE Technical Support. To contact MDE Technical Support for any of the foregoing situations, call the toll-free number below:

Medical Data Electronics Technical Support (800) 237-5243



5.1.1 No Display

Problem	Possible Cause	Action
No Display or Display blank	LINK Display is OFF LINK Base is OFF Brightness and/or Contrast may be out of adjustment Display connections may be loose	Turn LINK Display ON Turn LINK Base ON Adjust Brightness and/or Contrast to view LINK Display Power down system, check all Display connections. Restart system

5.1.2 Central Station does not Boot Up

Problem	Possible Cause	Action
Central Station does not Boot Up	LINK Display is OFF LINK Base is OFF Connections may be loose Hard Disk Drive may not be functioning System BIOS information corrupted or lost LINK Base system errors	Turn LINK Display ON Turn LINK Base ON Power down system, check all system connections. Restart system Confirm LED activity on HDD indicator on LINK Base Confirm HDD connections to HDD and to system motherboard IDE connector Attempt to boot system with System Reserve Disk Contact MDE Technical Support in the event of HDD formatting errors, allocation errors, or "cross-linked" messages Check internal system alkaline battery, expected battery life is three years. Replace if necessary. ROM BIOS may be corrupted, contact MDE Technical Support if ROM BIOS is suspected to be in error If internal system errors occur, they will often display some error text or coded information. Make note of any such messages and contact MDE Technical Support for assistance

5.1.3 No Communication "NO COMM"

Problem	Possible Cause	Action
"NO COMM" (no communication) message	<p>LINK Auxiliary Base (LAB) is OFF</p> <p>LAB is not functioning</p> <p>Connections may be loose</p> <p>ESCORT monitor is out of range</p> <p>ESCORT bedside not assigned to Central Station channel</p> <p>Central Station not recognizing the ESCORT bedside monitor</p> <p>The ESCORT II bedside monitor's antenna and/or tranceiver are missing and/or loose</p> <p>If more than one ESCORT II bedside monitor has lost communications and others seem to be falling out, check Noise Level on Power Levels page. If above 80%, interference may be occurring on Central Station frequency channel</p>	<p>Turn LAB ON</p> <p>Confirm LAB green LED indicator is ON and flashing steadily</p> <p>Power down system, check all system connections paying particular attention to the LAB antenna. Restart system</p> <p>Confirm that ESCORT monitor is in range and retry. Confirm LINK by accessing bedside Network Status page as seen in Figure 5-3.</p> <p>Confirm that bedside monitor is configured to Central Station channel.</p> <p>Confirm that Central Station is configured for monitor(s) in question, check Power Levels page at Central Station to confirm communication</p> <p>Check the connection to the tranceiver and the antenna connection. Tighten or replace if necessary</p> <p>Change Central Station frequency channel in system configuration. If possible, set to channel at least two (2) channels away from original</p>



5.1.4 Recorder Errors

Problem	Possible Cause	Action
No Recording	Recorder out of paper Paper in backwards Paper is jammed	Remove old paper cylinder (if present) and install new roll of paper noting orientation Remove paper and reinstall noting proper orientation (See Chapter 3, "System Components") Verify paper is loaded and aligned correctly. If evidence of a jam exists: remove paper, clean out all paper particles and reinstall paper noting orientation

5.1.5 Touchscreen Errors

Problem	Possible Cause	Action
Touchscreen not functioning or inaccurate screen response	Touchscreen out of calibration Touchscreen cable is loose or disconnected Touchscreen board in LINK Base is loose	Reset Central Station and touch the Touchscreen to calibrate when prompted during boot up procedure Follow the on screen instructions, three times you should be prompted to touch an X on the screen, three times the system should respond "OK" Turn off all power to LINK Base and LINK Display, reseat touchscreen connections at LINK Base and Display ends Turn power to LINK Base and Display back ON; calibrate touchscreen when prompted Turn off all power to LINK Base and LINK Display. Open LINK Base (See Chapter 6). Locate the touch- screen board. Remove and reseat the board. Reassemble system and power up. Calibrate touchscreen when prompted.



5.2 Arrhythmia Errors

Arrhythmia errors can occur for a variety of reasons, often times they are traced to problems with patient electrodes, lead wires, or cables. Always ensure that the patient ECG signal is as clean as possible and check for any suspect connections. Patient arrhythmia will need to be *relearned* following any adjustments. Refer to the ESCORT - LINK Model 3200B Operator's Manual for detailed troubleshooting information for arrhythmia errors. False Event Classifications, Missed Event Detection, and Failure to alarm, save, or record an event are each addressed in the Operator's Manual.

5.3 LINK Central Station and ESCORT Bedside Diagnostic Screens

The following pages present test and diagnostic screens that will prove useful while troubleshooting the LINK Central Station network. Both ESCORT II bedside monitor screens and LINK Central Station screens are provided.

5.3.1 ESCORT II Bedside Monitor Screens

Figures 5-1 through 5-4 present four key diagnostic screens which may be accessed for system information at the ESCORT II bedside monitor.

Figure 5-1 displays communication status and software version numbers for all installed parameters. Communication status codes are as follows:

- OK** - No faults detected; normal operating state
- I** - Parameter is INHIBITED by user configuration in monitor
(parameter selection; i.e., RESP vs. RESPCO2)
- D** - Parameter is DISABLED by user configuration in monitor
(PARAM AVAIL field in power-up defaults)
- V** - Version (protocol revision) mismatch between parameter and monitor;
the parameter will not be polled for data
- #** - Any numeric codes displayed for COMM status should be relayed to
MDE Technical Support for further direction

Figure 5-2 displays current configuration information, time and date, and RAM test status (i.e., in progress, passed, failed).

Figure 5-3 displays Network Status Information which confirms communication status to the Central Station, the current configured frequency and number of hops are also displayed.

Figure 5-4 displays the Check Communication Version screen. This screen may also be utilized to verify installed software modules as well as system compatibility. To confirm compatibility, any numbers read across horizontally should be identical.



5.3.2 LINK Central Station Diagnostic Screens

Figures 5-5 and 5-6 present the system Power Levels page and Protocol Revisions page. These screens are accessed through System Setup at the Central Station. The Power Levels page (see Figure 5-5) identifies all nodes communicating with the Central Station along with communication success rate, hops, and routing information. The Power Levels page is discussed in detail in Chapter 4, “Theory of Operation.”

The Protocol Revisions page (see Figure 5-6) is useful in two ways; it confirms acknowledgment of the Central Station software, LAB software, and Transceiver Software and their compatibility. First, confirm that there is a number displayed for *Board Type* in each of the three columns (LAB, TRANS (transceiver), and HOST (central station)); the value of the number is not of concern unless asked by MDE Technical Support to supply it. Absence of a value for board type serves as a flag that the Central Station is not recognizing or aware of a particular device. If a number is present, the system has recognized the item.

The Protocol Revisions page is also used to confirm software compatibility. For all rows, excluding *Board Type*, any columnar entries must match for any given row (example RFXLP is 04 in the LAB column, 04 in the TRANS column, and 04 in the HOST column, reference Figure 5-6). Diagnostically, be concerned that any listed values match, do not be concerned if a number is present or not. If the numbers are not identical, a protocol revision mismatch has occurred. This will require a software update to correct. Contact MDE Technical Support for instructions in the event of a protocol mismatch.

The Network status page displays scrolling information which reports communication status, success, and integrity. The Network Status page is not described in detail and should only be used when instructed by MDE Technical Support personnel.



PARAM	COMM	SW-VERS
MAIN	OK	01.00.01
ECG	OK	01.00.00
RESP	OK	01.00.00
SPO2	OK	01.00.00
BP1	OK	01.01.00
BP2	OK	01.01.00
NIBP	OK	01.01.00
TEMP	OK	01.01.00
CO2	OK	01.00.00
LINK	OK	01.00.00
RESPCO2	I	01.00.00

Figure 5-1: Check PROM Version is the first page displayed when accessing TEST Setup.

Installed software modules are displayed with communication status and software version

TEST SETUP

STAT INFO SW	CHECK COMM VER	CHECK PROM VER	NIBP REC START	NIBP TEST OFF
--------------------	----------------------	----------------------	----------------------	---------------------

Figure 5-2: Software Status Info page informs the user of the current configuration

CRT DISPLAY HARDWARE
TREND RECORDER
- CAN TURN ALL ALARMS OFF
-USER HAS SELECTED THE
ADULT MODE
-USER BOOTUP DEFAULTS

-ENGLISH LANGUAGE

PASSED RAM TEST

59.99HZ

12:09:11 PM 02/03/1994
ALARM SUSPEND
TEST SETUP

STAT INFO SW	CHECK COMM VER	CHECK PROM VER	NIBP REC START	NIBP TEST OFF
--------------------	----------------------	----------------------	----------------------	---------------------

NETWORK STATUS				
RF TRANSPONDER	1E4F			
CENTRAL TRANSPONDER	2A5C			
FREQ: 6 HOPS: 1				
-STATUS MESSAGES-				
RF:RC=C1, DT=01, NL=1E				
RF:RC=C1, DT=01, NL=1E				
RF:RC=C1, DT=01, NL=1A				
RF:RC=C1, DT=01, NL=1A				
RF:RC=C1, DT=01, NL=1A				
RF:RC=C1, DT=01, NL=1A				
RF:RC=C1, DT=01, NL=1A				
RF:RC=C1, DT=01, NL=1E				
RF:RC=C1, DT=01, NL=1E				
TEST SETUP				
STAT INFO NET	CHECK COMM VER	CHECK PROM VER	NIBP REC START	NIBP TEST OFF

Figure 5-3: Network Status Info page provides communication status information

Figure 5-4: Check Comm Version identifies installed software versions and confirms software compatibility

	MAIN	ERS	CO2	BPT	CO
ECGALP	01	01			
RESPALP	01	01	01		
SPO2ALP	02	02			
BPALP	03			03	
TEMPALP	01			01	
NIBPALP	03			03	
COALP	01				
CO2ALP	02		02		
TELMALP	01				
ALLALP	01	01	01	01	
TBLPRLP	01				
HCNLP	03			03	
DBUSPLD	02	02	02	02	
TABLALP	03				
RFPXLP					
RFNLP					
RFPLP					
IRNLP					
IRPLP					
TEST SETUP					
STAT INFO NET	CHECK COMM VER	CHECK PROM VER	NIBP REC START	NIBP TEST OFF	

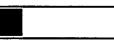
POWER LEVELS									
SUCCESS									
NAME	RATE	LOADING	HOP1	HOP2	HOP3	HOP4			
MON1/			36AC	52AB					
MON2/			36AC	116F					
MON3/			36AC	234A					
MON4/			36AC	234A	25BA				
MON5/			36AC	234A	25BA	42E6			
MON6/			36AC	7771					
MON7/			36AC	7771	3DDA				
MON8/			36AC	7771	3DDA	89BC			
NOT ASSIGNED									
NOT ASSIGNED									
NOT ASSIGNED									
NOT ASSIGNED									
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NOT ASSIGNED									
FREQ: 6	NOISE LEVEL		SYSTEM LOADING						
Main Ver: 3.0.0.0 50/60Hz									
Hostess Ver: 3.0.0.0									
Local Transponder Ver: 01.00.00.00									
LAB Ver: 01.00.00.00									

Figure 5-5: LINK Central Station - Power Levels Page



PROTOCOL			
	LAB	TRANS	HOST
Board Type	14	09	11
ECGALP			
RESPALP			
SAO2ALP			
BPALP			
TEMPALP			
NIBPALP			
COALP			
CO2ALP			
TELMALP	01		
ALLALP	01	01	
TBLPRLP	01	01	01
HCNLP	03	03	03
DBUSPLP	02	02	
TABLALP	03		
RFPRLP		02	02
RFXLP	04	04	04
RFNLP	01	01	01
RFPLP		01	
IRNLP			
IRPLP			
HTLNLP	02	02	02
SDLCPLP	01	01	01
HOSTALP			06

EXIT

Figure 5-6: LINK Central Station - Protocol Revisions Page

6

Mechanical Disassembly

6

MECHANICAL DISASSEMBLY

WARNING: Performing the procedures included in this section will expose the technician to **HIGH VOLTAGES** which are potentially dangerous. Furthermore, **Electro-Static Discharge (ESD)** sensitive components will be exposed.

WARNING: **ONLY** qualified technicians possessing adequate knowledge of these voltages and having the ability to perform service on biomedical monitoring equipment should proceed.

6.1 LINK Base Disassembly

Disassembly of the LINK base may be required to perform repairs on system components or for the replacement of system boards (PCBAs). Follow all instructions carefully, noting orientation of all connectors and cables. Operations should be performed in reverse order for replacement. Disassembly instructions are presented for the following:

- Top cover removal
- Recorder removal
- Switching power supply removal
- System floppy disk drive removal
- Hard disk drive removal
- Archive floppy disk drive removal
- PCBA removal

Note: A complete list of spare parts and accessories available for the LINK Central Station may be found in Appendix A.

6.1.1 Top Cover Removal

To open the LINK Base, the top cover must be removed. Perform the following steps to remove the top cover:

1. Turn off all power to the LINK base, LINK display, and LAB
2. Disconnect all AC power cords
3. Disconnect all external cables at the rear of the LINK base
4. Remove the LINK Display (if located on LINK Base) and set aside
5. Remove the five screws located on the rear of the LINK base (see Figure 6-1)
6. Remove the top cover of the LINK base

TOP COVER SCREW LOCATIONS

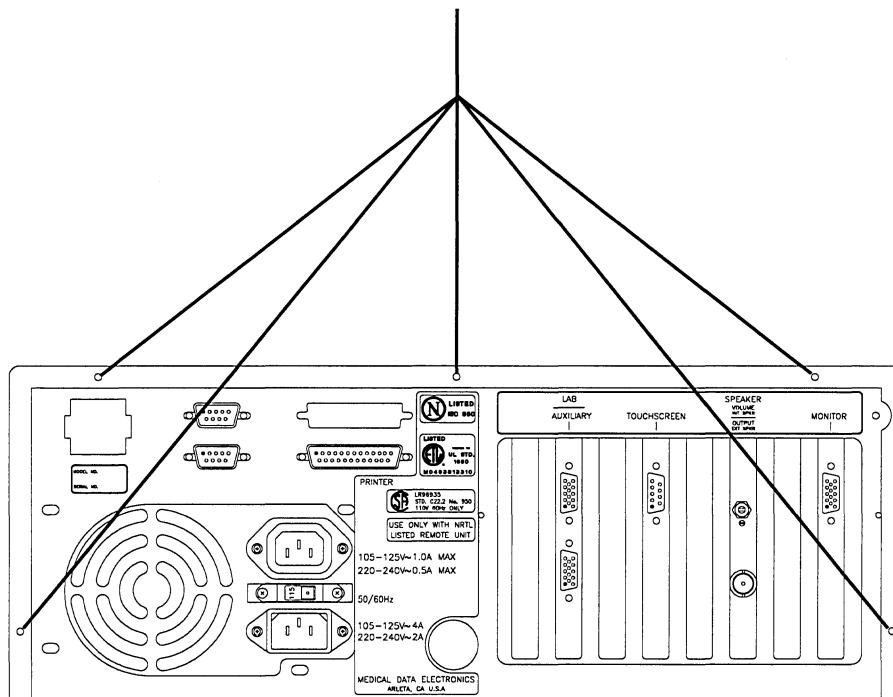


Figure 6-1: Top Panel - Screw Location

6.1.2 Recorder Removal

1. Remove LINK base top cover (see paragraph 6.1.1)
2. Disconnect the 50-pin recorder interface cable at the rear of the recorder (note orientation for replacement)
3. Open recorder door at front of LINK base
4. Remove recorder paper
5. Loosen the two phillips screws located at the rear of the open recorder cavity
6. Carefully pull out the recorder by gently grasping the paper holders and pulling in an outward motion until it has cleared the LINK base

6.1.3 Switching Power Supply Removal

1. Remove LINK base top cover (see paragraph 6.1.1)
2. Disconnect power connections to motherboard (P1, P2), system floppy disk drive, hard disk drive, and archive floppy disk drive (if installed)
3. Locate and remove the two screws securing the power supply to the bottom of the LINK base (inside the LINK base on the bottom of chassis)
4. Remove the four (4) screws securing the power supply on the rear panel of the LINK base (see Figure 6-2)
5. Remove the power supply

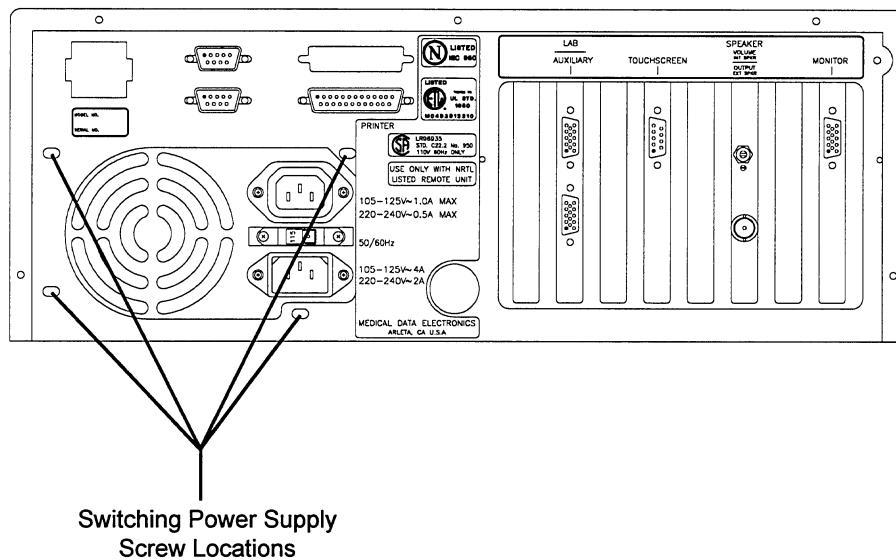


Figure 6-2: Switching Power Supply - External Screw Location

6.1.4 System Floppy Disk Drive Removal

1. Remove LINK base top cover (see paragraph 6.1.1)
2. Disconnect 34-pin data cable from System Floppy Disk Drive (FDD)
3. Disconnect 4-pin power cable from System Floppy Disk Drive (FDD)
4. Disconnect 40-pin data cable from Hard Disk Drive (HDD)
5. Disconnect 4-pin power cable from Hard Disk Drive (HDD)
6. Remove the three (3) screws securing the drive bay which houses the system FDD and the HDD (see Figure 6-3)
7. Remove the drive bay
8. Set the removed drive bay on an anti-static surface
9. Remove the four (4) screws securing the system FDD (2 each side)
10. Carefully slide the FDD forward out of the drive bay



6.1.5 Hard Disk Drive Removal

1. Remove LINK base top cover (see paragraph 6.1.1)
2. Disconnect 34-pin data cable from System Floppy Disk Drive (FDD)
3. Disconnect 4-pin power cable from System Floppy Disk Drive (FDD)
4. Disconnect 40-pin data cable from Hard Disk Drive (HDD)
5. Disconnect 4-pin power cable from Hard Disk Drive (HDD)
6. Remove the three (3) screws securing the drive bay which houses the system FDD and the HDD (see Figure 6-3)
7. Remove the drive bay
8. Set the removed drive bay on an anti-static surface
9. Remove the four (4) screws securing the system HDD (2 each side)
10. Carefully slide the HDD forward out of the drive bay

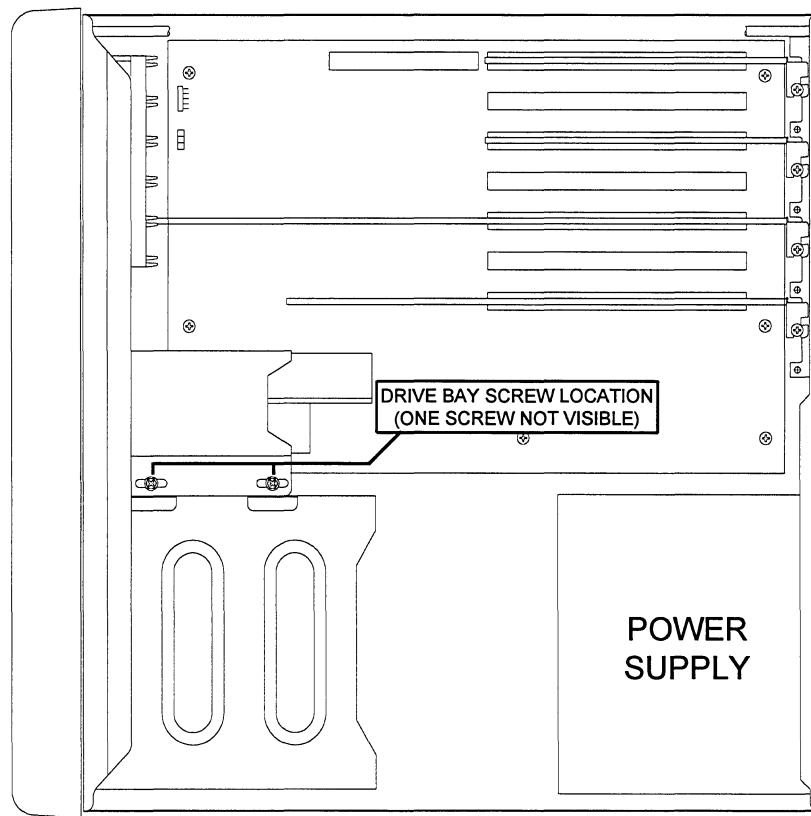


Figure 6-3: System FDD/HDD Drive Bay - Screw Location

6.1.6 Archive Floppy Disk Drive Removal

1. Remove LINK base top cover (see paragraph 6.1.1)
2. Disconnect 34-pin data cable connected to archive drive
3. Disconnect 4-pin power cable
4. Remove the screws securing the Archive Floppy Disk Drive (see Figure 6-4)
5. Pull the Archive FDD forward out the front panel of the LINK base

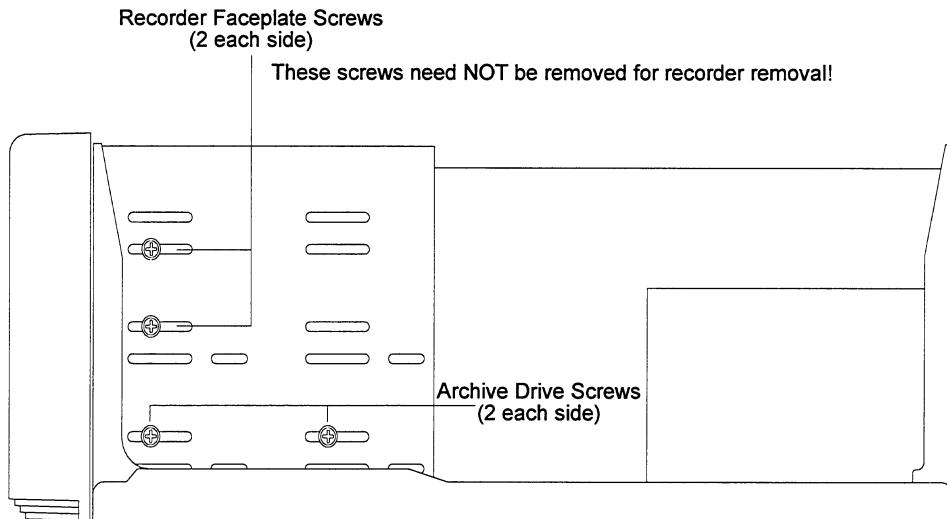


Figure 6-4: LINK Base - Side View (Archive Floppy Disk Drive - Screw Location)

6.1.7 PCBA Removal

1. Remove LINK base top cover (see paragraph 6.1.1)
2. Locate the PCBA to be removed or reseated (see Figure 6-5 for steps 2, 3, and 4)
3. Remove the screw securing the cardedge to the LINK base chassis
4. Grasp each end of the exposed PCBA edge and slowly pull out the board with a gentle rocking motion
5. Set the board on an anti-static surface or in an anti-static bag

Note: *Be careful when replacing PCBA so as to ensure that it reseats in motherboard connector.*

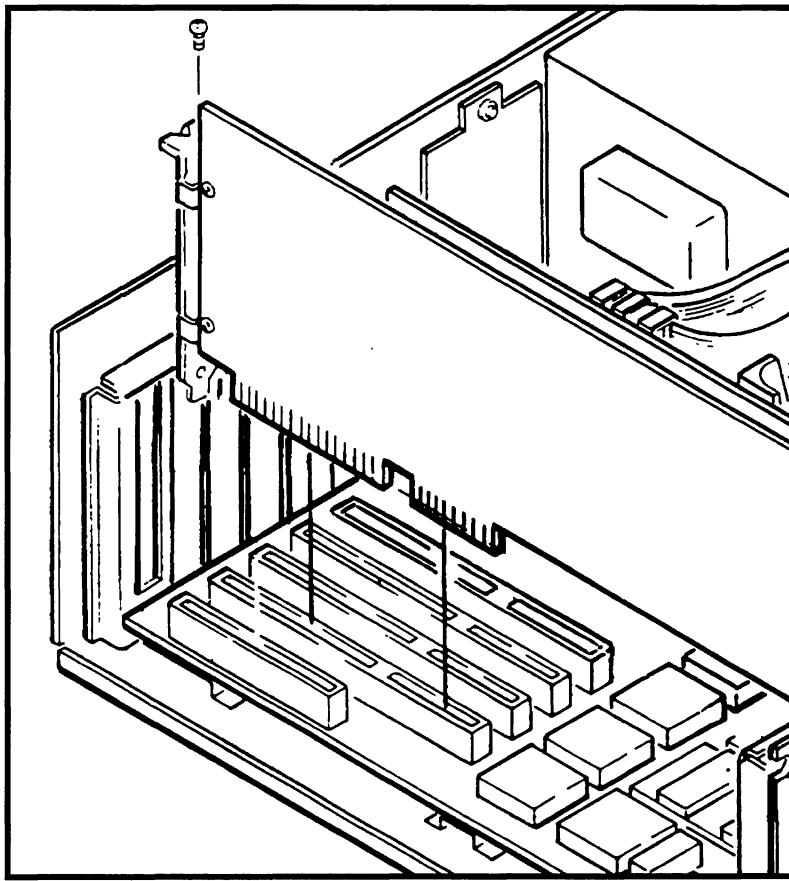


Figure 6-5: LINK Base - PCBA Removal

6.2 LINK Auxiliary Base (LAB) Disassembly

Disassembly of the LINK Auxiliary Base may be required to perform repairs on internal components or to replace an electronics board (PCBA) within the LAB. Figure 6-6 presents an exploded view of the LAB which should prove to be a helpful reference during the disassembly process. Refer to Figure 6-8 (Connector Panel Assembly) for orientation of the Serial I/O and CPU boards.

All operations should be performed in reverse order for replacement and reassembly. The disassembly instructions presented for the LAB are as follows:

- Transceiver removal
- Connector Panel Assembly removal
- CPU Board removal
- Serial I/O Board removal
- Power Supply Board removal

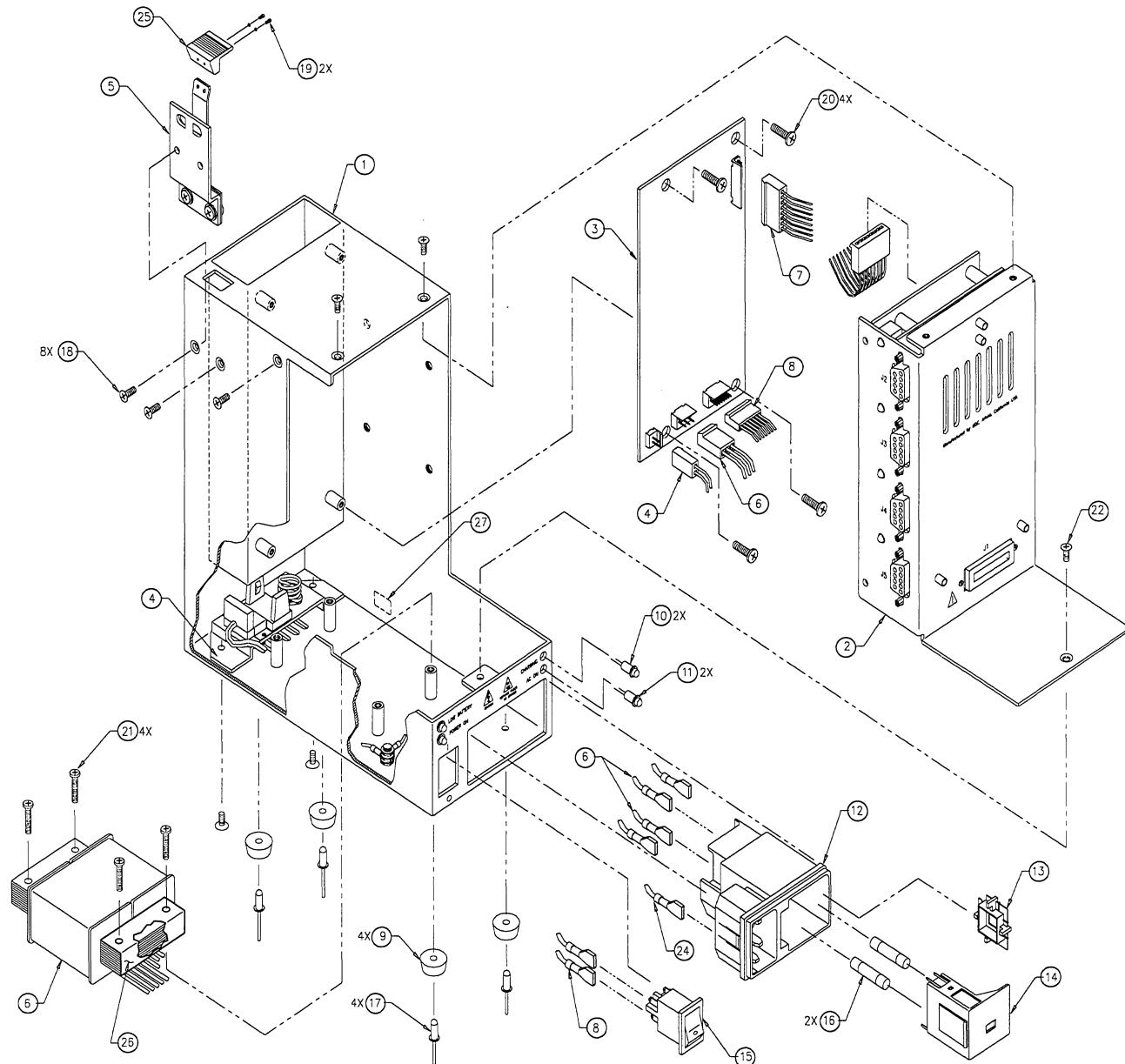


Figure 6-6: LINK Auxiliary Base - Exploded View



6.2.1 Transceiver Removal

1. Turn off all AC power to the LINK Central Station
2. Turn the AC power switch on the rear of the LAB to the OFF (0) position
3. Disconnect AC power cord from the rear of the LAB
4. If LAB battery option installed, remove at this time
5. Disconnect LINK/LAB interface cable (connected to the LAB at connector J2, which is the top DB-9 connector)
6. Loosen the three spring-loaded screws securing the transceiver module to the LAB
7. Carefully pull the transceiver away from the LAB and set aside

6.2.2 Connector Panel Removal

1. Remove transceiver per paragraph 6.2.1
2. Remove two (2) phillips screws on *top* of LAB (near antenna location, see Figure 6-7)
3. Remove two (2) phillips screws on left side of LAB (see Figure 6-7)
4. Remove the single phillips screw located on the top of the connector panel base (just above AC receptacle, see Figure 6-7)
5. Carefully begin to pull the connector panel away from the LAB, disconnect the LAB CPU interface cable (see Figure 6-6, item 7) from the CPU board when accessible
6. Carefully finish pulling the connector panel away from the LAB to conclude removal

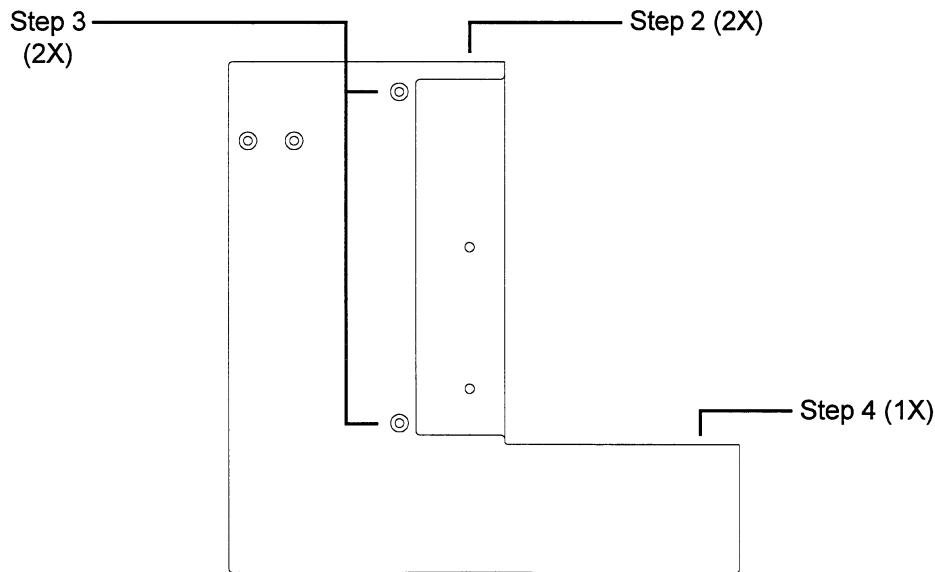


Figure 6-7: LINK Auxiliary Base - Screw Location

6.2.3 CPU Board Removal

1. Remove the Connector Panel per paragraph 6.2.2
2. Remove the four (4) phillips screws located on the rear of the CPU board
3. Carefully pull the CPU board away from the SIO board and Connector Panel paying close attention to the 40-pin IDC connector (J2 on CPU board) holding the two boards together

6.2.4 SIO Board Removal

1. Remove the Connector Panel per paragraph 6.2.2
2. Remove the CPU board per paragraph 6.2.3
3. Remove the two (2) phillips screws located on the outside of the Connector Panel on either side of the 20-pin transceiver connector (J1)
4. Carefully remove the Serial I/O board

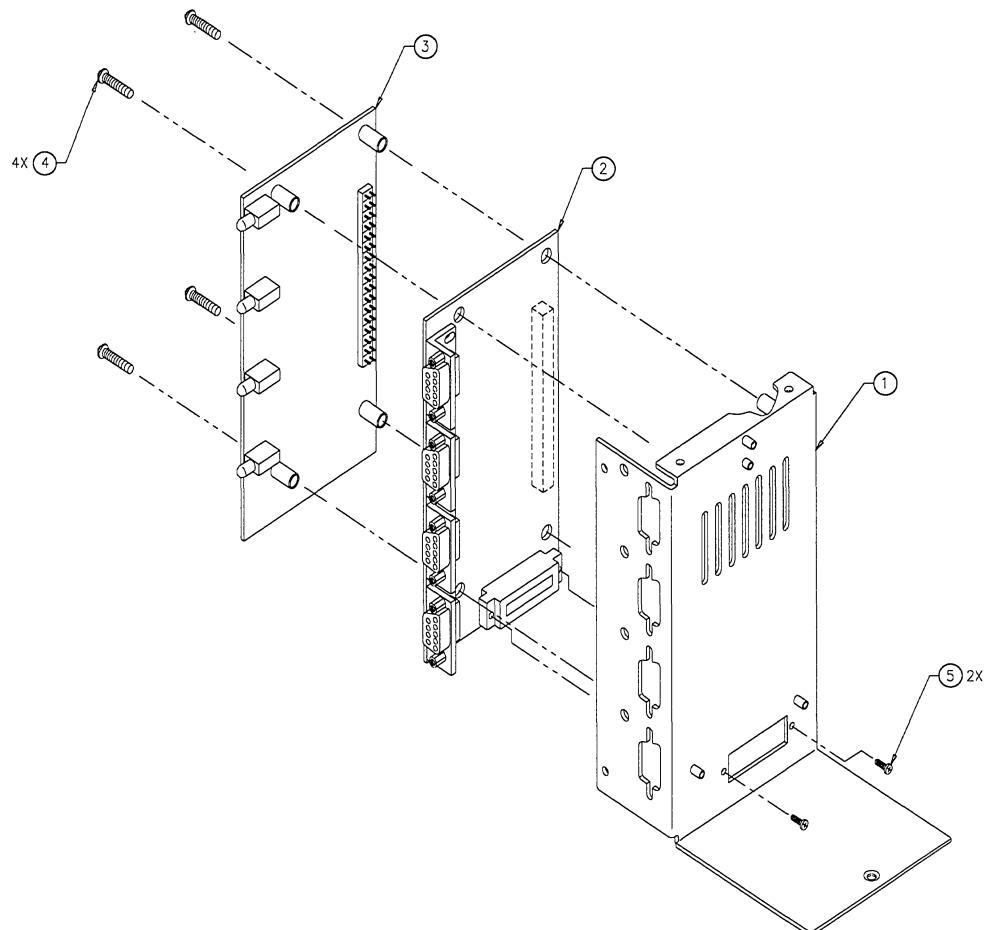


Figure 6-8: LAB Connector Panel Assembly



6.2.5 Power Supply Board Removal

1. Remove the Connector Panel per paragraph 6.2.2
2. Disconnect P1, P2, and P3 connectors (located near transformer)
3. Remove the four (4) phillips screws securing the Power Supply board to the LAB chassis
4. Carefully remove the LAB Power Supply board

Table 6-1: Parts Listing, LINK Auxiliary Base

MDE Part Number	Description	Quantity	Reference
358100-0041A	SCR, 6-32 X 1/4 PHL PNHD	4	20
358100-0051A	SCR, 2-56 X 3/16,SKTHD,BLK	2	19
358100-0125A	SCR, 4-40 x 7/8-LG,PHL PNH STL	4	21
358100-0133A	SCR, TAPTITE,4 x 3/16~LG,100DEG,FLH PHL STL Zn PLT	1	22
360300-0026A	POWER MODULE, AC W/VOLT SELECT	1	12
360300-0027A	FUSE HOLDER, VOLT SELECT	1	14
360300-0030A	FUSE, 0.25A SLO-BLO (5X20MM) UL & CSA	2	16
360500-0023A	NUT, #6 HEX,LRG PTRN	3	23
360500-0036A	HARDWARE, RUBBER FEET, LIGHT GREY	4	9
360600-0012A	1/8 ALUMINUM RIVET (SHORT POP RIVET)	4	17
362000-0030A	L.E.D., SNAP-IN YELLOW DIFFUSED	2	10
362000-0031A	L.E.D., SNAP-IN GREEN DIFFUSED	2	11
380000-0002A	SW, ROCKER,PWR,TYPE DPST,6A,BLK	1	15
384000-0186A	VOLTAGE SELECT INSERT 115/230V	1	13
385000-0032A	ADHESIVE, STRUCTURAL 2 PART EPOXY	0	28 - AS REQUIRED
401076-0000	HANDLE E3 MONITOR REV. A	1	25
401247-0000	E3 BATTERY PACK W/ LABEL ASSY REV. A	1	-
401796-0000	PCBA, LINK ACCESSORY BASE PWR SPPLY REV C (E1704)	1	3
401839-0000	CABLE ASSEMBLY - FRONT PANEL LAB REV. B(E1434)	1	8
401840-0000	BATTERY RESTRAIN ASSY - LAB REV. A(E1334)	1	5
401845-0000	*MOD* CHASS-LINK ACCES BASE(LAB)REV G (E1852)	1	1
401847-0000	BATTERY SPRING BOARD ASSY LAB REV. A1 (D470)	1	4
401938-0000	LAB TRANSFORMER ASSY REV. C(E1884)	1	6
401939-0000	CBL ASSY, P/S, CPU INTERFACE LAB REV. B(E1434)	1	7
401972-0000	FAB PAINT SCR #4 x 3/16 TAPTITE REV B (E1748)	8	18
401978-0000	LBL, SERIAL #, 1/2~ x 1~,E2B/E3B REV. B(E1612)	1	27
401982-0000	LAB CONNECTOR PANEL ASSEMBLY REV. A(E1334)	1	2
402023-0000	LAB CHASSIS GROUND CABLE ASSY. REV. B(E1434)	1	24
402149-0000	FISH PAPER, TRANSFORMER LAB REV. A(E1434)	1	26

**Table 6-2: Parts Listing, LAB Connector Panel Assembly**

MDE Part Number	Description	Quantity	Reference
358100-0010A	SCR, 4-40 X 1/2,PH PNHD ZINC	2	5
358100-0108A	SCR, 6-32 X 3/4~ PHPNHD ZINC PLTD	4	4
401792-0000	PCBA, LINK ACCESSORY BASE CPU REV C (E1763)	1	2
401794-0000	PCBA, LINK ACCESSORY BASE SERIAL I/O REV C (E1772)	1	3
401844-0000	CONNECTOR PANEL (LAB) REV. C(E1852)	1	1

7

LINK Options

LINK OPTIONS

7.1 LINK Central Station Options

Various options and accessories are available for the LINK Model 3200B Central Station. This chapter presents the more notable options and provides a brief description of each. The options discussed are the Archive Option (used for archiving patient trend data to diskette), the HP LaserJet Printer (used for printing trend data and full disclosure information), Arrhythmia Monitoring (up to eight patients monitored for twelve arrhythmia types), Full Disclosure (24 hour patient numeric and displayed waveform data saved to the system hard disk drive), and the Uninterruptible Power Supply (provides battery backup power to the Central Station).

7.1.1 Archive Option

Patient data archiving is available with the installation of a second 3 1/2", 1.44M byte Floppy Disk Drive and additional software to support archiving. The LINK Base is already equipped with the ability of supporting up to two floppy drives. The required cabling (a 34-pin ribbon cable) is present for the installation of the archive drive.

Data received from the bedside monitor is stored in RAM and sent to an archive diskette upon the request of the operator. Both tabular and graphical trend data may be archived for up to six (6) parameters. The parameters available for archiving are the same parameters selected for numeric display in the LINK Central Station configuration.

Archived tabular trend data is available for viewing in 1, 2, 3, 4, 5, 10, 15, 30, 45, and 60 minute intervals. Archived graphical trend data is charted every ten (10) seconds for those parameters selected in the system configuration. In both cases, up to 24 hours of archive information is available for evaluation.

Patient monitoring will be suspended when sending data to an archive diskette. The duration of the delay will be longer depending upon the amount of patients and/or data to be archived. Refer to warning messages displayed at the bottom of the screen when performing the archive. Patient monitoring will not be suspended when retrieving archive files from an archive diskette.

7.1.2 Hewlett-Packard LaserJet 4L Printer Option

The ESCORT II - LINK network may include an HP LaserJet 4L Printer for producing hard copy documents of patient trend and archive data. When the LINK Central Station includes the Full Disclosure option, all 24 hour patient information is available for printing. Only the HP LaserJet 4L and 100% compatible printers are authorized by Medical Data Electronics for use with the ESCORT - LINK network. The printer is connected to the parallel port (*25-pin female, D-connector*) located on the back of the LINK Base. A parallel printer cable is included for making the connection from the LINK Base to the printer.

Printed data is available for further analysis, and long time permanent storage. The 300 dpi LaserJet printed information is crisp and detailed, ideal for photocopying and faxing.



7.1.3 Arrhythmia Monitoring Option

The ESCORT - LINK Central Station with the arrhythmia option installed provides arrhythmia monitoring for up to eight patients and is available in one patient increments. Any ESCORT II Model 20100 or 20300 patient monitor identified on the network may be monitored for arrhythmia events at a given time. The following are the arrhythmia types monitored by the ESCORT - LINK Central Station:

- **Asystole**
- **Run**
- **High HR (Heart Rate)**
- **High AB Rate**
- **Bigeminy**
- **Slow Run**
- **Vfib**
- **Missed Beat**
- **Low HR**
- **Tachy**
- **Trigeminy**
- **Couplet**

To enable arrhythmia monitoring, first enable the patient's ECG waveform at the Central Station, then enter the ARR/ALARM SETUP page by choosing this option at the bottom of the main screen. The ARR/ALARM SETUP page is shown in Figure 7-1; each of the twelve arrhythmia types are listed on this page along with additional alarm controls and settings. The columns listed across the top of the Arrhythmia / Alarm Setup page function as follows:

- **RECORD** - When ON, the LINK Central Station produces a recording strip on the single-channel thermal recorder of the displayed waveform each time an alarm event is detected. Recordings are a minimum of twenty (20) seconds or for the duration of the event.
- **SAVE** - When ON, twenty (20) seconds of waveform data is stored in Event History each time an alarm event is detected.
- **HOLD** - When ON, the most recent event of the selected arrhythmia type will be displayed below the real-time ECG trace in the waveform tile. The event time and number of abnormal beats per minute (ABN/MIN) will also be displayed.
- **ALARM** - When ON, enables the audible alarm tone and visible alarm message. (see Table 7-1 for details of the visual alarm message)
- **LEVEL** - Assigns the seriousness and priority level of the alarm event. Level 1 alarms have top priority followed by levels 2 and 3. Higher level events will override lower level event alarm messages, tones, and held waveforms. (see Table 7-1 for explanation of levels)

**Table 7-1: Arrhythmia and Alarm Level Information**

Level of Alarm	Alarm Condition	Audible Tone	Visual Message
1	Most Serious (Life Threatening)	Modulated - High/Low Once per second	Flashing Red Alarm Icon - Once per second
2	Serious	Once per second	Flashing Yellow Alarm Icon - Once per second
3	Informational	Once every 4 seconds	Continuous Yellow Alarm Icon displayed



ARRHYTHMIA / ALARM SETUP							
PATIENT ID: ESCORT II #2							
TYPE	RECORD	SAVE	HOLD	ALARM	LEVEL	LIMIT	
ASYSTOLE	OFF	ON	ON	ON	1		
VFIB	OFF	ON	ON	ON	1		
RUN	OFF	ON	ON	ON	1	3	↑
MISSED BEAT	OFF	ON	ON	ON	1	1.8	↑
COUPLET	OFF	ON	ON	ON	2		
HIGH HR	OFF	OFF	OFF	ON	2	140	↑
LOW HR	OFF	ON	ON	OFF	2	50	↑
HIGH AB RATE	OFF	OFF	OFF	OFF	2	10	↑
TACHY	OFF	OFF	ON	ON	2	8	↑
BIGEMINY	OFF	OFF	OFF	OFF	2		
TRIGEMINY	OFF	ON	ON	OFF	2		
SLOW RUN	OFF	OFF	OFF	ON	2	10	↑
BEDSIDE ECG	OFF	ON			1		
RESPIRATION	OFF	ON			1		
NIBP	OFF	ON			1		
INVASIVE BP	OFF	ON			1	Arrhythmia Processing ON	
SPO2	OFF	ON			1	Bedside Alarm Tones OFF	
CO2	OFF	OFF			1		
SELECT PATIENT	RELEARN	STANDBY	BEDSIDE ALM TONE	USER DEFAULTS	CANCEL CHANGES	ARR ON/OFF	EXIT

Figure 7-1: Arrhythmia / Alarm Setup



7.1.4 Full Disclosure Option

The ESCORT - LINK Central Station Full Disclosure Option offers a means of saving all waveform data acquired over the last twenty-four (24) hour period to the system hard disk drive. Up to eight patients may be assigned to full disclosure for the retention of such information as waveform data, time, heart rate, and abnormal beat.

Full Disclosure data is captured every thirty seconds and logged onto the hard disk drive. Waveform data may be printed on the optional HP LaserJet 4L printer. Two options exist for printing the full disclosure data. The first option produces a one page format which displays one hour of waveform data. The other option produces a standard 25 mm/second scale resulting in fifty (50) seconds of waveform printed per page with a 25 mm/second grid background included. The resulting printout presents five recorder strips, each composed of ten seconds of waveform data. Each strip includes the time and date of the information and events being printed.

7.1.5 Uninterruptible Power Supply (UPS)

The Uninterruptible Power Supply, or *UPS* offers added safety and security for your system's monitoring needs. As the name implies, power is supplied to the ESCORT - LINK Central Station without interruption when a UPS is installed. The UPS output is never interrupted because it does not need to switch from line power to battery power. Instead, the AC power constantly charges the UPS batteries which in turn provide power to the LINK Central Station. This provides clean power less the erratic characteristics of the AC power line. In the event the AC power is removed or lost, the batteries continue uninterrupted power to the Central Station for approximately nine (9) minutes.

The UPS alarms when running on battery power allowing the user to follow an appropriate power down sequence where patient status may be reviewed and acted upon prior to removal of power.

Note: The UPS is ONLY to be used to supply power to the Central Station (LINK Base, LINK Display, and LAB). DO NOT connect the LaserJet printer, or any other devices to the UPS. Connecting these devices could activate the UPS breaker circuit.



A Spare Parts &
Accessories

Appendix A



SPARE PARTS and ACCESSORIES

This appendix supplies tabulated information of common spare parts and accessories available for the ESCORT - LINK 3200B Central Station network and associated system components.

Contact MDE Technical Support at (800) 237-5243 for parts and pricing information. They will be able to assist you with any questions or inquiries.

Parts and pricing information supplied in this manual and by MDE Technical Support are subject to change without notice.

ESCORT - LINK Central Station options are discussed in Chapter 7, "LINK Options."



ESCORT - LINK Model 3200B Central Station Spare Parts List

Item	Part Number
LINK Display with Touchscreen Installed	Model 3200D
Thermal Array Recorder	366000-0015A
Transceiver Module	Model 20011
LINK Switching Power Supply	402366-0000
Hard Disk Drive (200M+)	366000-0033A
Floppy Disk Drive (3 1/2")	366000-0020A
Repeater Assembly	500334
Link Auxiliary Base (LAB) - Model 20010	Model 20010
LINK Smart Hostess Board	402051-0000
LINK Touchscreen Controller Board	401186-0000
LINK 486DX Motherboard	402364-0000
LINK VGA Controller Board	402365-0000
LINK Recorder / Watchdog Timer Board	402040-0000
LAB CPU Board	401792-0000
LAB Serial I/O Board	401794-0000
LAB Power Supply Board	401796-0000
Recorder Data Cable	401194-0000
IDE HDD Controller Cable	401800-0000
Floppy Disk Drive Controller Cable	401799-0000
Hospital Grade AC Power Cord	350200-0010A
Touchscreen Interface Cable	350000-0008A
LINK / LAB Interface Cable	402078-0000
Transceiver Antenna	340000-0026A

ESCORT - LINK Model 3200B Central Station Accessories List

Part Number	Description
E2700-08	Archive to ASCII Database Program (3 1/2" diskette)
E2700-32	Recorder Paper / Box of 10 Rolls
E2700-51	Uninterruptible Power Supply (110 Volt, 60 Hz)
E2700-54	Recorder Paper / Case of 100 Rolls
E2700-74	E3200B Power Isolation Transformer (ONEAC 240VA, Medical Grade) (110 volt, 60Hz)
E9040-50	ESCORT II Model 20100 Service Manual
E9030-50	ESCORT II Model 20100 Operator's Manual
E9040-51	ESCORT II Model 20300 Service Manual
E9030-51	ESCORT II Model 20300 Operator's Manual
E9040-52	ESCORT - LINK Model 3200B Service Manual
E9030-52	ESCORT - LINK Model 3200B Operator's Manual



B Central Station
Software

Appendix B

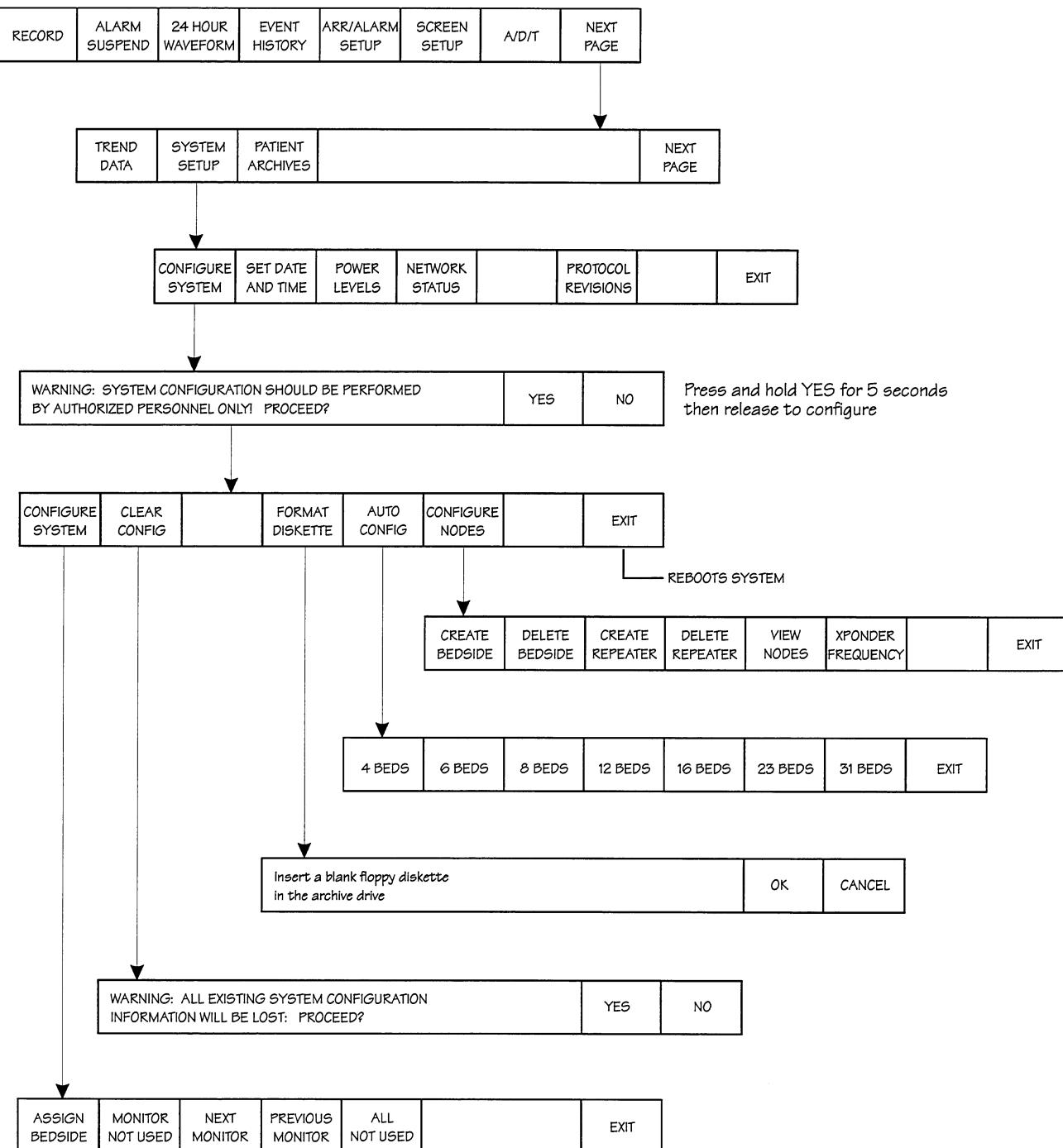


CENTRAL STATION SOFTWARE

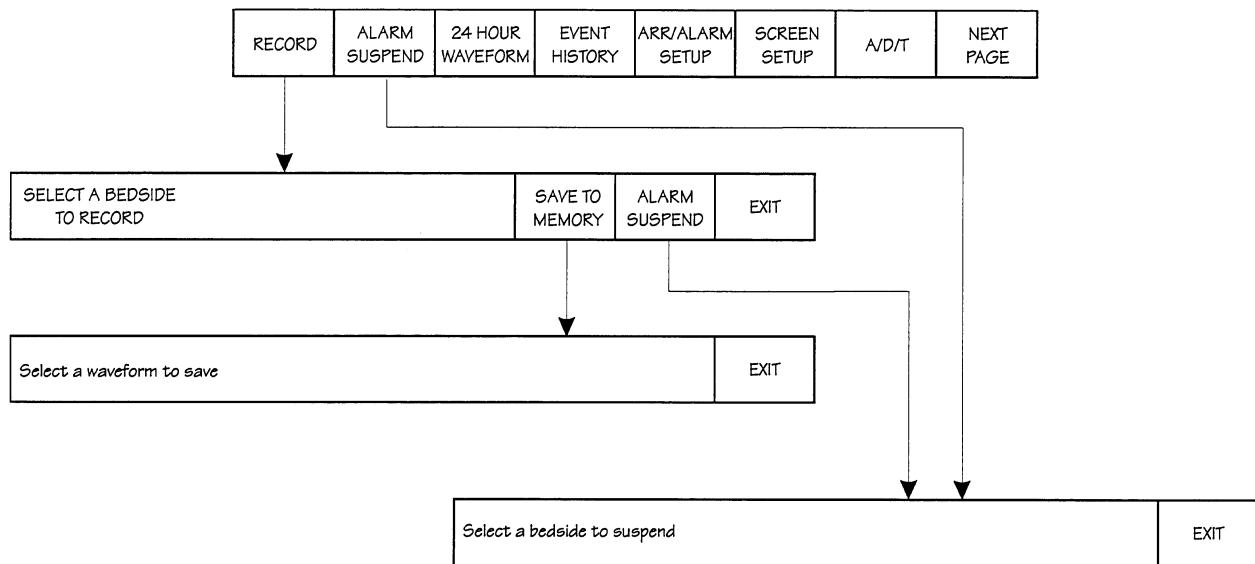
Software Flow

The purpose of this appendix is to graphically present ESCORT - LINK Central Station software flow. For detailed operational instructions, refer to the Model 3200B Central Station Operator's Manual. Use this appendix for streamlined navigation through the Central Station software. The illustrations on the following pages are annotated to identify each of the software *branches* accessible from the Central Station home screen. Some selections displayed may not be available on your system as some of those selections are used solely for Central Station options such as Full Disclosure or Patient Archiving. The items presented are as follows:

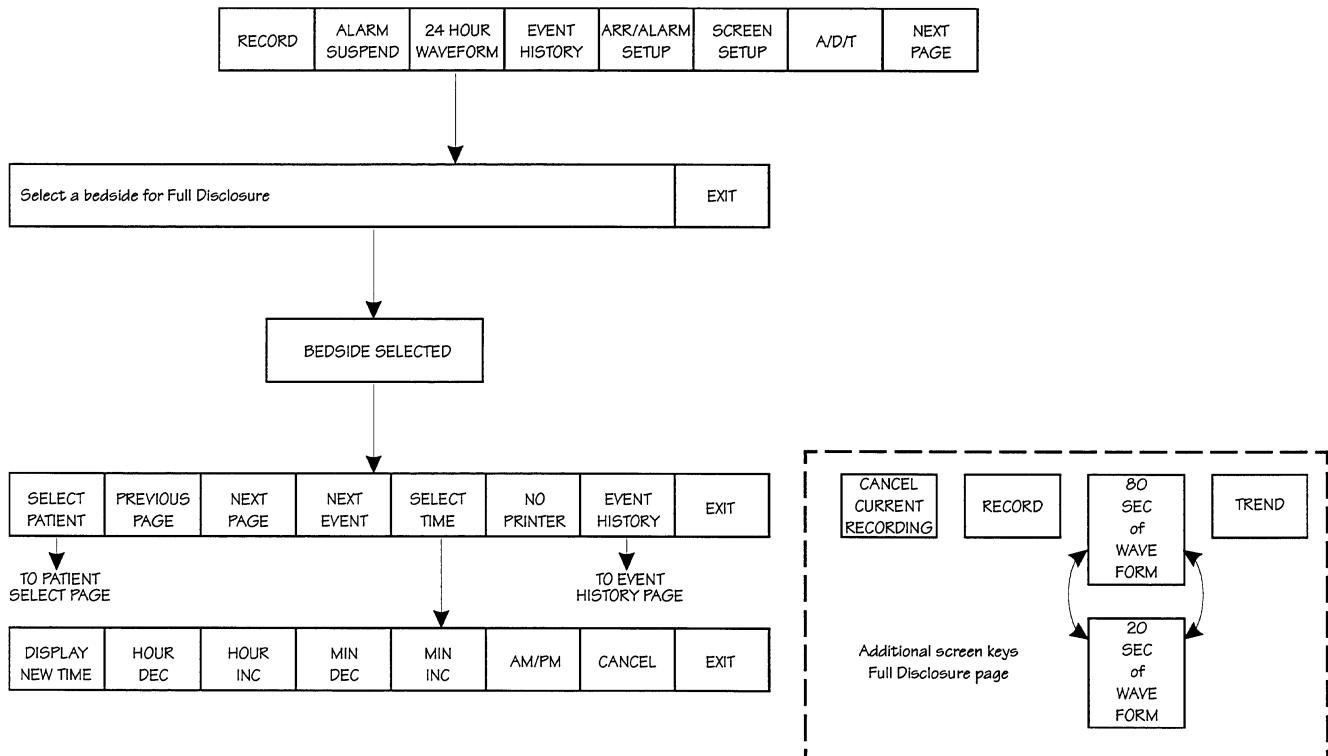
- Configuration Branch
- Record & Alarm Setup Branches
- 24 Hour Waveform (Full Disclosure) Branch
- Event History Branch
- Arrhythmia/Alarm Setup Branch
- Screen Setup Branch
- Admit/Discharge/Transfer Branch
- Trend Data, System Setup, and Patient Archives Branches



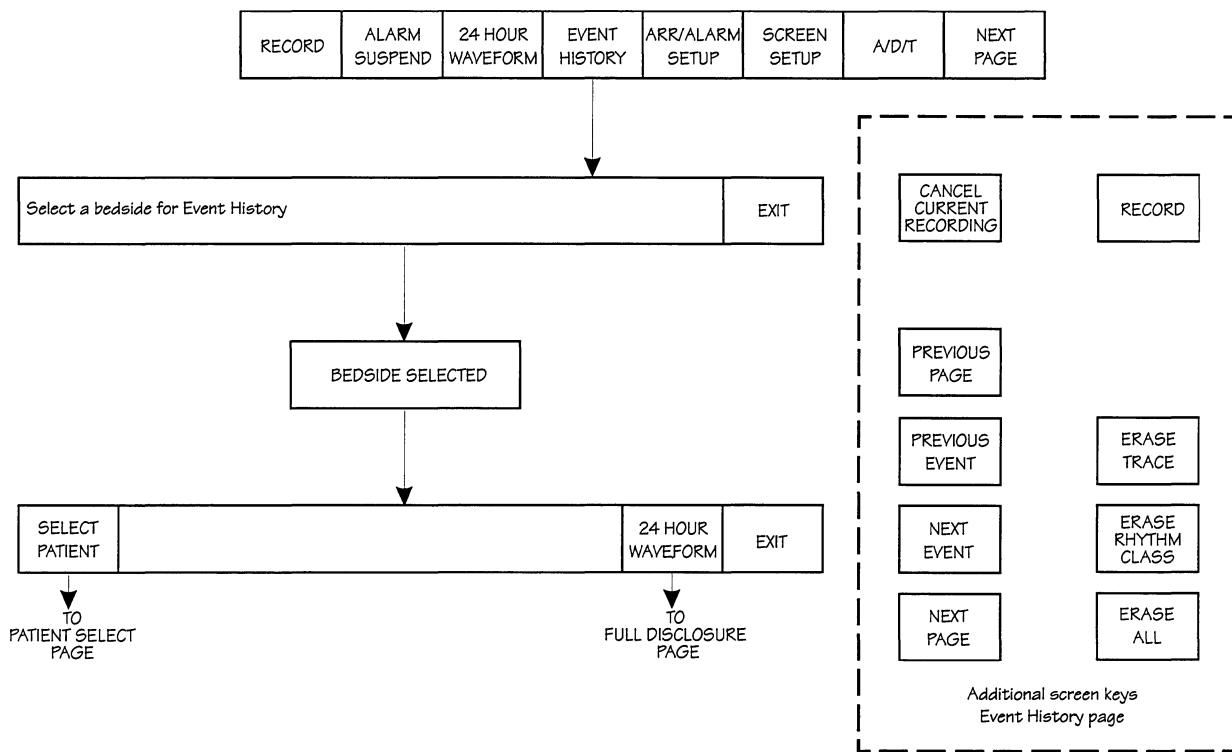
Configuration Branch



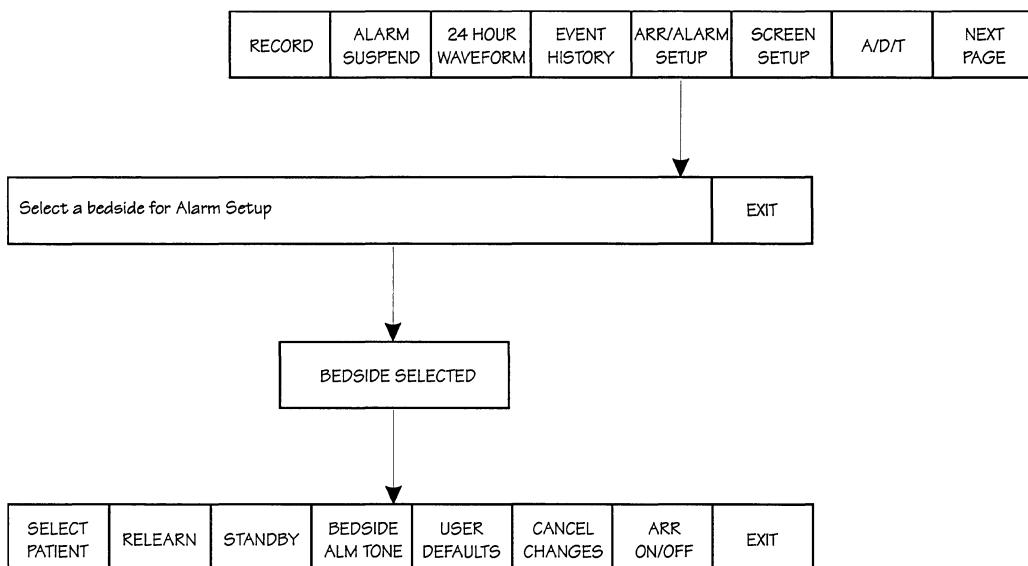
Record & Alarm Suspend Branches



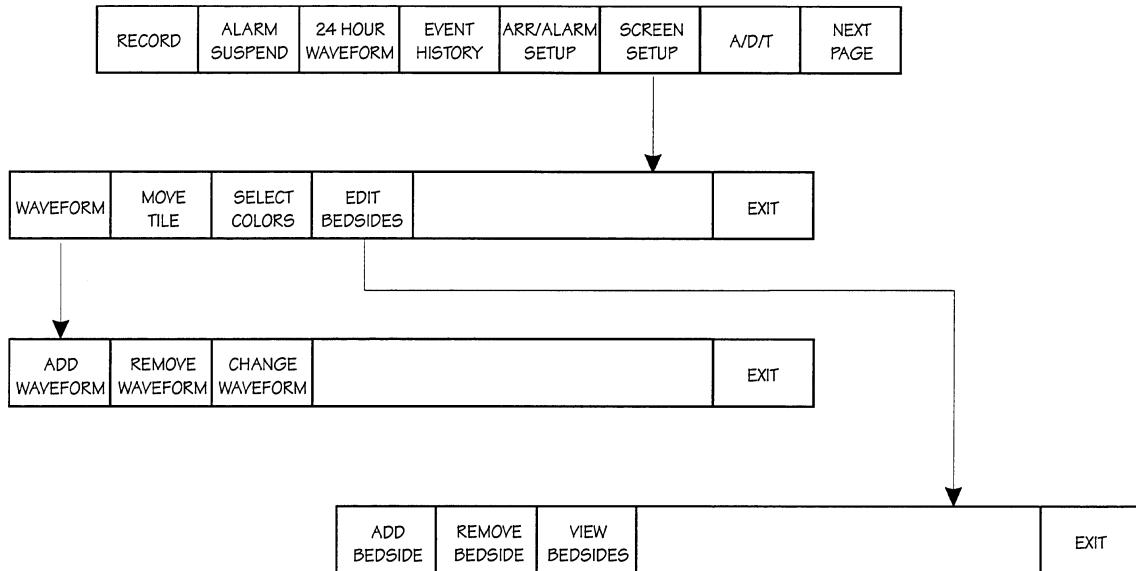
24 Hour Waveform (Full Disclosure) Branch



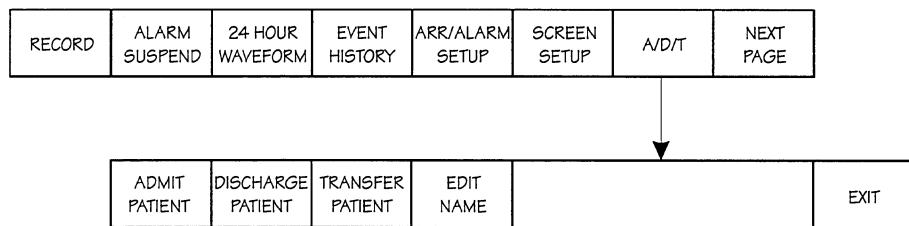
Event History Branch



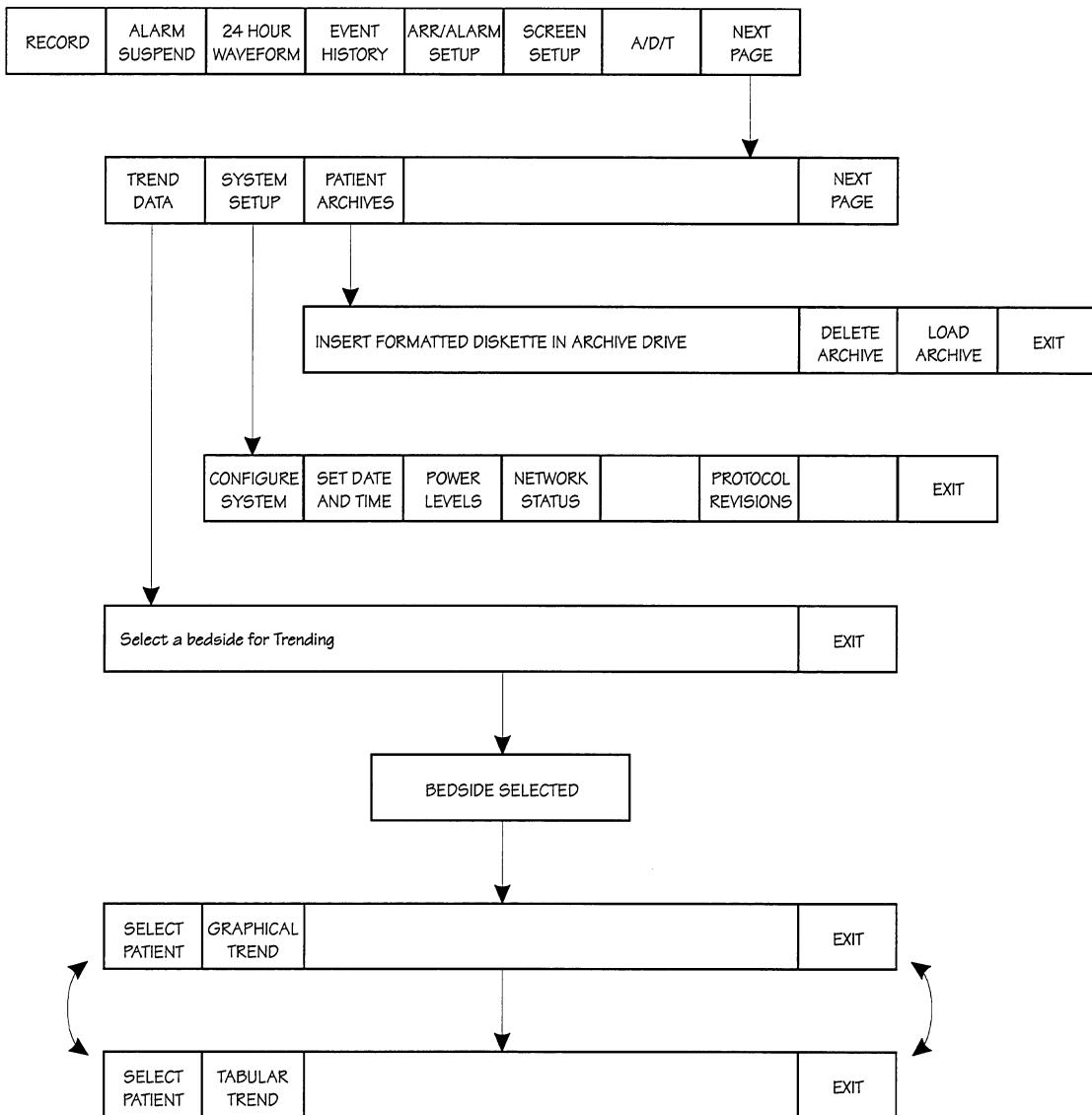
Arrhythmia/Alarm Setup Branch



Screen Setup Branch



Admit/Discharge/Transfer Branch



Trend Data, System Setup, and Patient Archives Branches

C Configuration

Appendix C



CONFIGURATION

Configuration

WARNING: Patient monitoring is suspended while configuring the Central Station. Any trend information (which resides in RAM) will be lost!

WARNING: Configuration should only be performed by qualified service personnel or those members of the clinical staff who are completely familiar with the Central Station and the configuration process.

WARNING: Configuration has been preset at the factory. A complete node list has been created which includes all of the ESCORT II bedside monitors and AutoNet repeaters at your establishment. Utilize the following procedures *ONLY* in the event that your configuration needs to be altered or has been lost.

This appendix provides the information necessary to configure the ESCORT - LINK Model 3200B Central Station. The purpose of this appendix is to offer quick instructions and a reference for Central Station configuration. Detailed configuration instructions may be found in the Model 3200B Operator's Manual.

The Central Station may be *automatically* configured for 4, 6, 8, 12, 16, 23, or 31 bedside monitors. Auto configuration will select ECG as the default waveform type, turn on all available arrhythmia monitoring (up to 8 patients), set up all alarms, and configure the parameter tile.

The Central Station may also be *manually* configured for any number of bedside monitors (not exceeding 32). Default waveform type, arrhythmia monitoring options, alarm settings, and the parameter tile may be configured by the operator to any of the available options as they are displayed during the configuration process.

Access to the configuration menu is protected by using the touchscreen's *untouch* feature. An operator is inhibited from entering the configuration portion of the Central Station software unless they touch and hold *YES* at the confirmation prompt for at least five (5) seconds prior to releasing. This guards against undesired configuration changes. If no configuration exists, the Central Station will display the configuration menu at bootup.



To enter the configuration menu, perform the following:

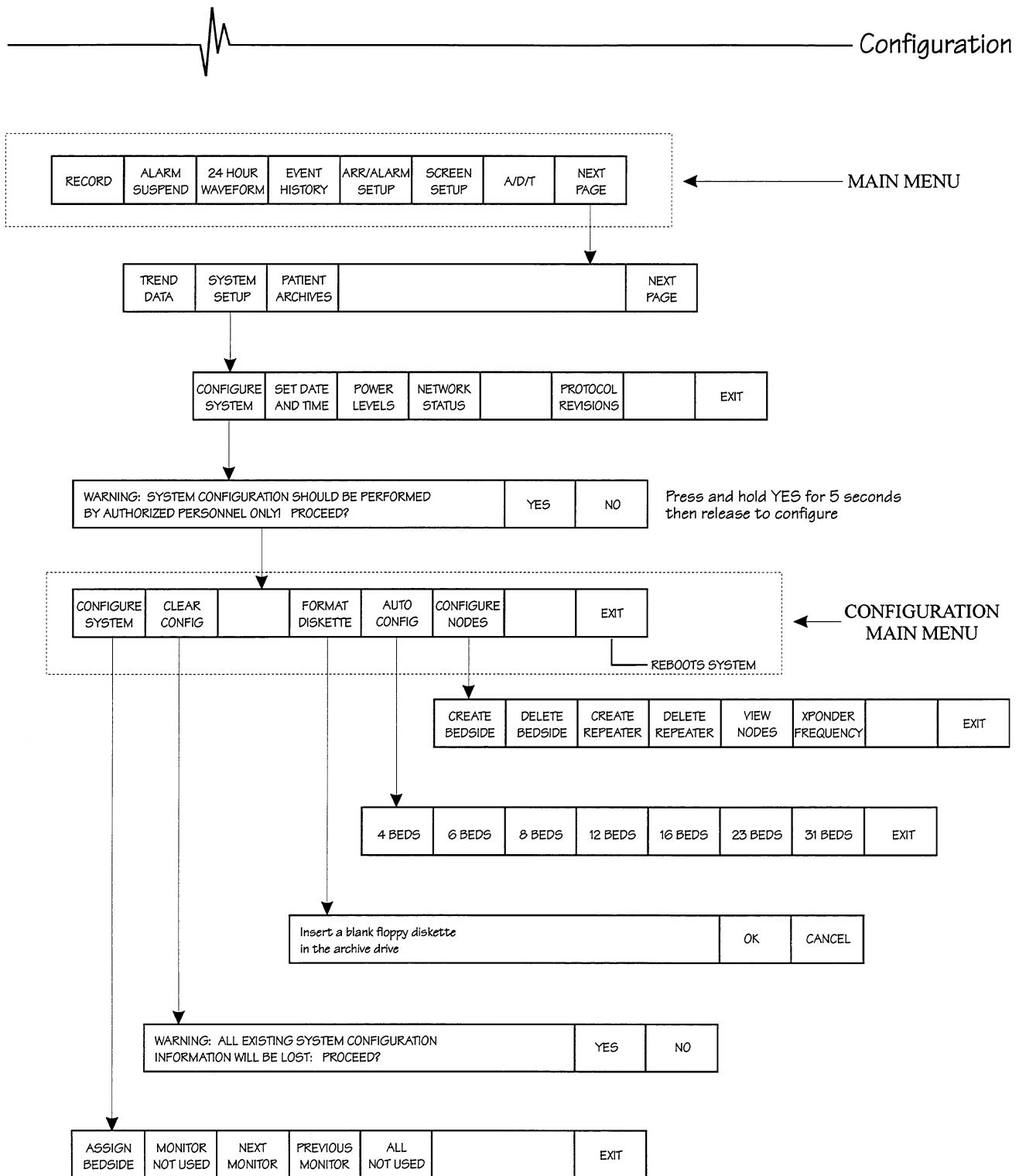
- From the main screen, press **NEXT PAGE**
- Press **SYSTEM SETUP**
- Press **CONFIGURE SYSTEM**
- Press and hold **YES** for a minimum of five (5) seconds, then release

After gaining access to the configuration menu, it will be necessary to verify the existing node list. The node list will contain all ESCORT II monitors and AutoNet Repeaters which have already been created at the Central Station. Any additions or deletions to the node list should be made prior to configuring the Central Station.

Once the Central Station Node List has been verified (or created), the operator may choose auto or manual configuration. Configuration menus are detailed in the figure on the following page.

The configuration process may be summarized as follows:

- **Verify, Create, or Delete Nodes**
- **Choose Auto or Manual configuration**
- **Restart Central Station**



Configuration Tree



Displaying the Central Station Node List

1. From the configuration menu, press **CONFIGURE NODES**
2. Press **VIEW NODES**
3. Node List will be displayed as below, verify all entries

NODES			
"B" indicates node is an ESCORT II bedside monitor	32AB	B	MON1
4-digit hexadecimal identification number	26D1	B	MON2
	1161	B	MON3
	CB56	B	MON4
	4332	B	MON5
	76AC	B	MON6
	3336	B	MON7
	84BA	B	MON8
"R" indicates node is a Repeater	0F00	R	REP-1

EXIT

NOTE: Nodes displayed in *white* are currently assigned for use in the network.
Nodes displayed in *gray* are currently inactive (not in use) by the network.



Creating a new system node

1. From the configuration menu, press **CONFIGURE NODES**
2. Press **CREATE BEDSIDE** or **CREATE REPEATER** depending upon what type of node is to be added to the system configuration
3. Using the onscreen keyboard, type the name that will be displayed for the ESCORT II monitor or AutoNet repeater. This name will be displayed on the system Power Levels page (ESCORT II monitors and AutoNet repeaters) and in the parameter tile (ESCORT II monitors only) after it has been assigned.
4. Press **ENTER** on the onscreen keyboard
5. Using the onscreen hexadecimal keypad, enter the node's 4-digit identification number (transceiver ID#)
6. Press **EXIT**

Deleting a system node

1. From the configuration menu, press **CONFIGURE NODES**
2. Press **DELETE BEDSIDE** or **DELETE REPEATER** depending upon what type of node is to be deleted from the system configuration
3. A node list will be displayed for the type of nodes selected
4. Select any nodes displayed in gray to delete

Auto Configuration

1. From the configuration menu, press **AUTO CONFIG**
2. Select **4, 6, 8, 12, 16, 23, or 31 Beds**
3. Press **EXIT**
4. Central Station will reboot, configuration changes will take effect

Note: All Auto Configuration options are presented at the end of this appendix.



Manual Configuration

Manual configuration may be performed for all system nodes and settings. The following procedures are inclusive of all manual configuration options. These procedures may be performed in whole or in part.

Assigning an ESCORT II Bedside Monitor or AutoNet Repeater

1. From the configuration menu, press **CONFIGURE SYSTEM**
2. Press **ASSIGN BEDSIDE**
3. Select any node displayed in gray (available)
4. Press **NEXT MONITOR** to scroll forward to the next available address number (1-32) if additional nodes are to be assigned
5. Press **PREVIOUS MONITOR** to scroll backward to previous address numbers
6. Press **MONITOR NOT USED** to clear an individual address assignment
7. Press **ALL NOT USED** to clear all node assignments
8. When all ESCORT II bedside monitors and AutoNet repeaters have been assigned, press **EXIT**

Current ID Name assignment	Address #					
NOT ASSIGNED	1					
ASSIGN BEDSIDE	MONITOR NOT USED	NEXT MONITOR	PREVIOUS MONITOR	ALL NOT USED		EXIT



Configuring the Parameter Tile

1. From the configuration menu, press **CONFIGURE SYSTEM**
2. Press **EXIT** (if all nodes have been assigned) to display the parameter tile configuration screen

A parameter tile template is located on the left side of the screen, available options are listed on the right side of the screen (see below)

3. Select any available option, then touch the desired location on the parameter tile template
4. The parameter will be displayed in the selected location
5. Configure up to six (6) parameters
6. Press **EXIT**

HR	NONE
NONE	NONE
NONE	NONE

HR	NIBP S
RESP	NIBP D
BP1 S	NIBP M
BP1 D	Sp02
BP1 M	TEMP 1
BP2 S	CO
BP2 D	CO2
BP2 M	NONE

SELECT A PARAMETER FROM THE RIGHT HAND GROUP

EXIT



Setting the Default Waveform Type

1. From the configuration menu, press **CONFIGURE SYSTEM**
2. Press **EXIT** (if all nodes have been assigned)
3. Press **EXIT** again (if all changes to parameter tile are complete)
4. Select any of the waveform options listed (see below), selection will be displayed in red lettering and will be used as the default waveform type
5. Press **EXIT**

WAVEFORM TYPES	
ECG	
Blood Pressure 1	
Blood Pressure 2	
SpO2 Pleth	
Respiration	
Carbon Dioxide	
EXIT	



Assigning an Overview Tile(s)

1. From the configuration menu, press **CONFIGURE SYSTEM**
2. Press **EXIT** (if all nodes have been assigned)
3. Press **EXIT** again (if all changes to parameter tile are complete)
4. Press **EXIT** again (if all changes to default waveform are complete)
5. Overview tile assignment screen will be displayed (see below)
6. Select overview tile(s) prompt appears. If configuration requires an overview tile (greater than eight ESCORT II monitors), select tile location(s)
7. Press **EXIT**

NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED
NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED
NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED
NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED	OVERVIEW
Select overview tile(s)			EXIT



Assigning an ESCORT II Bedside Monitor to an empty Tile

1. From the configuration menu, press **CONFIGURE SYSTEM**
2. Press **EXIT** (if all nodes have been assigned)
3. Press **EXIT** again (if all changes to parameter tile are complete)
4. Press **EXIT** again (if all changes to default waveform are complete)
5. Press **EXIT** again (if overview tile is either assigned or not desired)
6. Press **ASSIGN BEDSIDE** to place the bedside monitor listed at the bottom of the screen in an empty screen tile. The assigned tile becomes the parameter tile.
7. Press **ADD WAVEFORM** to assign a waveform tile to the first open tile located to the left of the parameter tile. The waveform can be displayed across one, two, or three screen tiles (as many as are available)
8. Press **NEXT MONITOR** to increment to the next monitor available (then repeat steps 6 and 7 to assign parameter and waveform tiles as desired)
9. Press **REMOVE BEDSIDE** to remove a monitor from the screen (note: the monitor remains in the node list)
10. Press **EXIT**

MON1		MON1			
PARAMETER		WAVEFORM			
MON2		MON2			
PARAMETER		WAVEFORM			
MON3	MON4	MON5	MON6		
PARAMETER	PARAMETER	PARAMETER	PARAMETER		
NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED	OVERVIEW		
REMOVE BEDSIDE	NEXT MONITOR	REMOVE WAVEFORM		ADDRESS: 1-ASSIGNED MON1	EXIT



Configuring the Default Arrhythmia and Alarm Settings

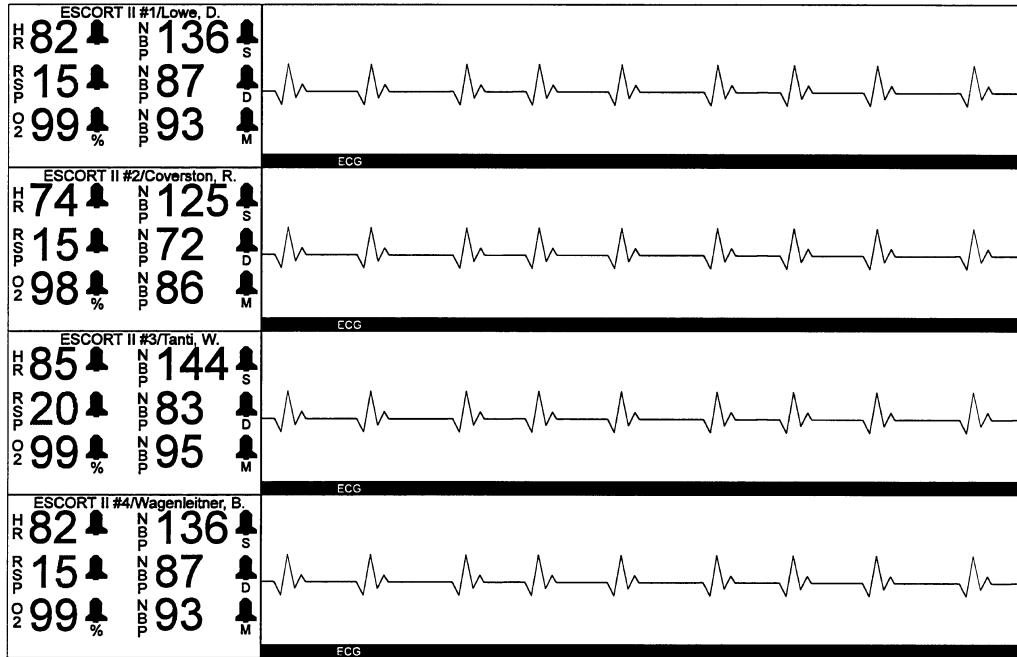
1. From the configuration menu, press **CONFIGURE SYSTEM**
2. Press **EXIT** (if all nodes have been assigned)
3. Press **EXIT** again (if all changes to parameter tile are complete)
4. Press **EXIT** again (if all changes to default waveform are complete)
5. Press **EXIT** again (if overview tile is either assigned or not desired)
6. Press **EXIT** again (if all bedsides have received screen assignments)
7. Set Arrhythmia ON or OFF by toggling the **ARRHYTHM ON/OFF** menu key
8. Set individual alarms ON or OFF by toggling the **ON/OFF** keys
9. Set alarm priority levels by scrolling through the displayed choices (1, 2, or 3)
10. Set alarm limits by touching the **↑** and **↓** keys
11. Press **EXIT**

ARRHYTHMIA / ALARM SETUP								
TYPE	RECORD	SAVE	HOLD	ALARM	LEVEL	LIMIT		
ASYSTOLE	OFF	ON	ON	ON	1			
VFIB	OFF	ON	ON	ON	1			
RUN	OFF	ON	ON	ON	1	3	↑	↓
MISSING BEAT	OFF	ON	ON	ON	1	1.8	↑	↓
COUPLETT	OFF	ON	ON	ON	2			
HIGH HR	OFF	OFF	OFF	ON	2	140	↑	↓
LOW HR	OFF	ON	ON	OFF	2	50	↑	↓
HIGH AB RATE	OFF	OFF	OFF	OFF	2	10	↑	↓
TACHY	OFF	OFF	ON	ON	2	8	↑	↓
BIGEMINY	OFF	OFF	OFF	OFF	2			
TRIGEMINY	OFF	ON	ON	OFF	2			
SLOW RUN	OFF	OFF	OFF	ON	2	10	↑	↓
BEDSIDE ECG	OFF	ON			1			
RESPIRATION	OFF	ON			1			
NIBP	OFF	ON			1			
INVASIVE BP	OFF	ON			1			
SPO2	OFF	ON			1			
CO2	OFF	OFF			1			
					FACTORY DEFAULTS		ARRHYTHM ON	EXIT

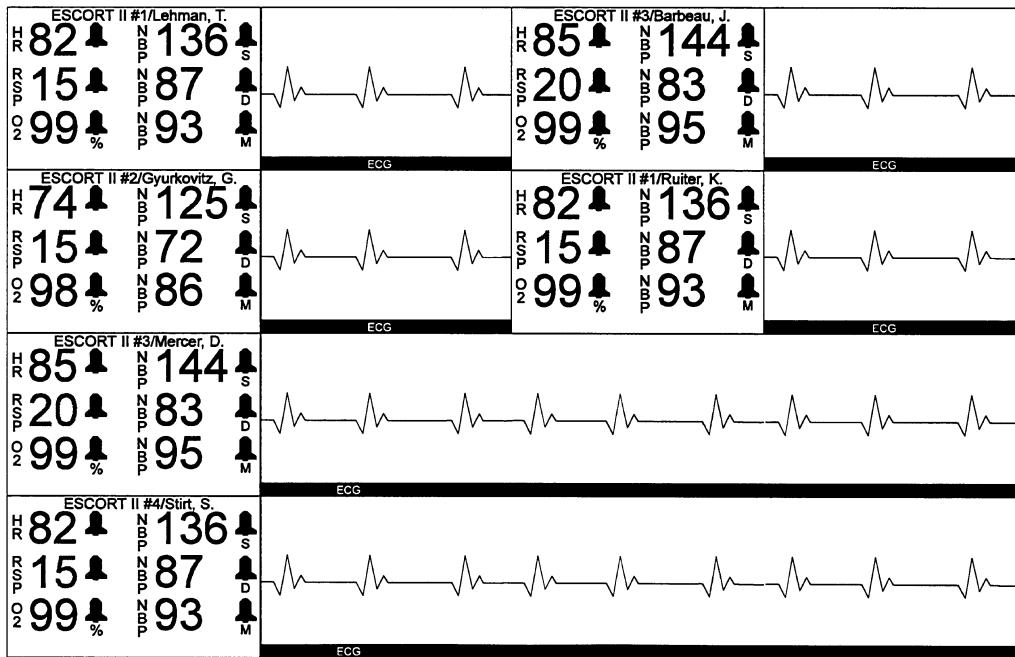


Exiting and Restarting the Central Station

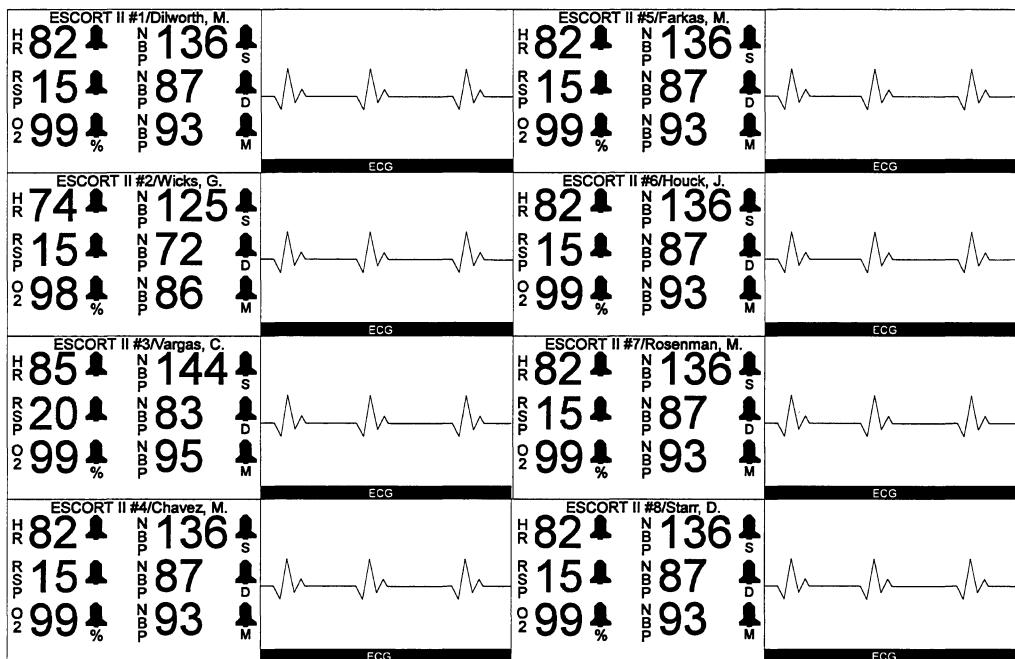
1. Upon returning to the main configuration menu, Press **EXIT**
2. The Central Station will now reboot
3. All configuration changes will now be active



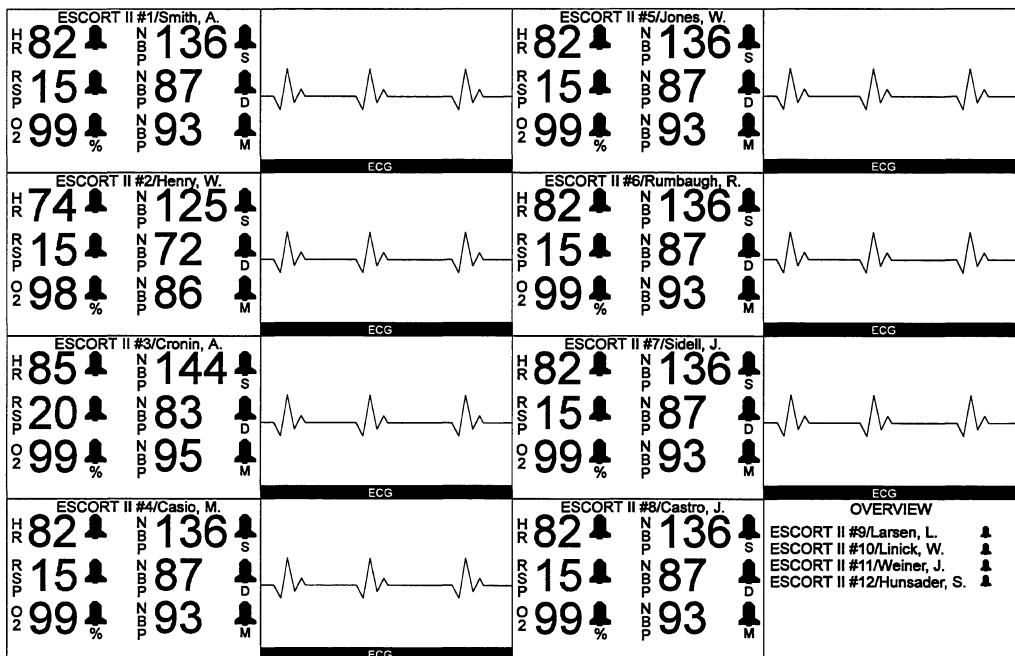
Model 3200B Central Station Auto Configuration - 4 Patients



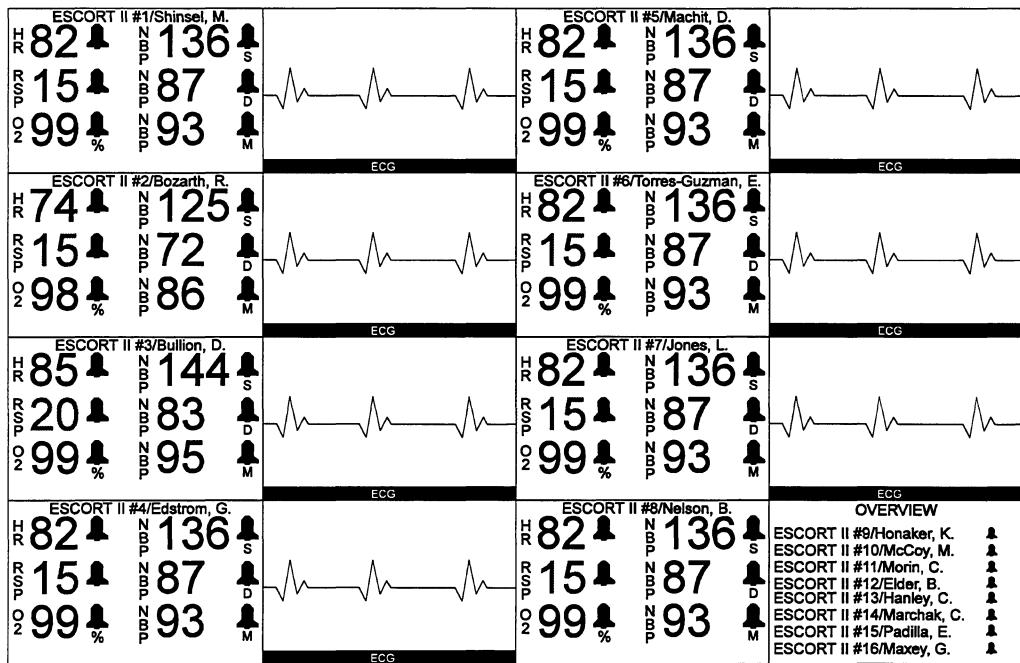
Model 3200B Central Station Auto Configuration - 6 Patients



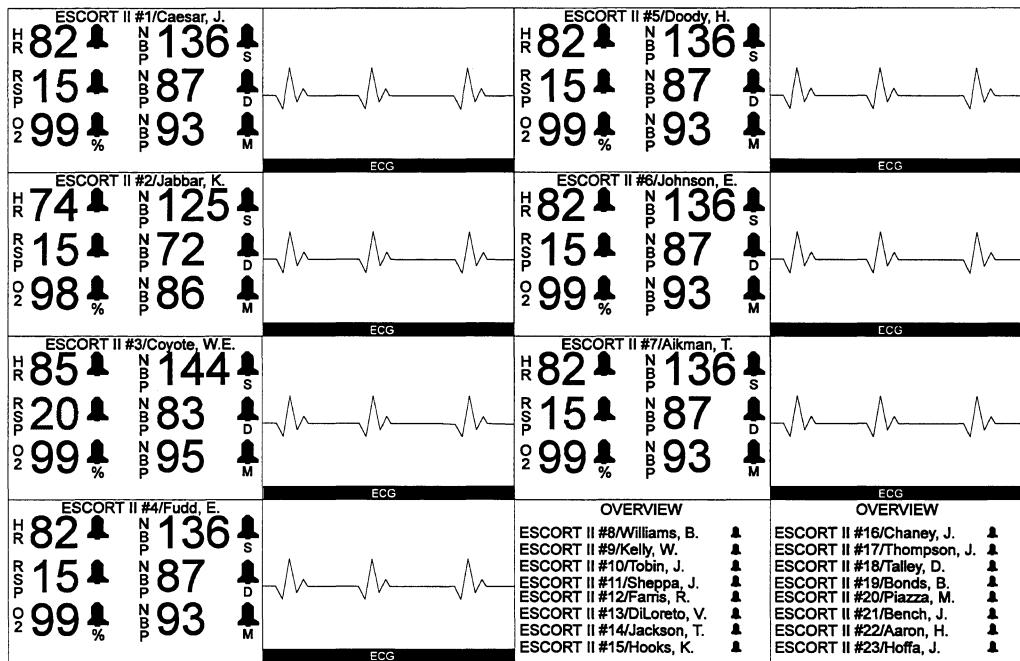
Model 3200B Central Station Auto Configuration - 8 Patients



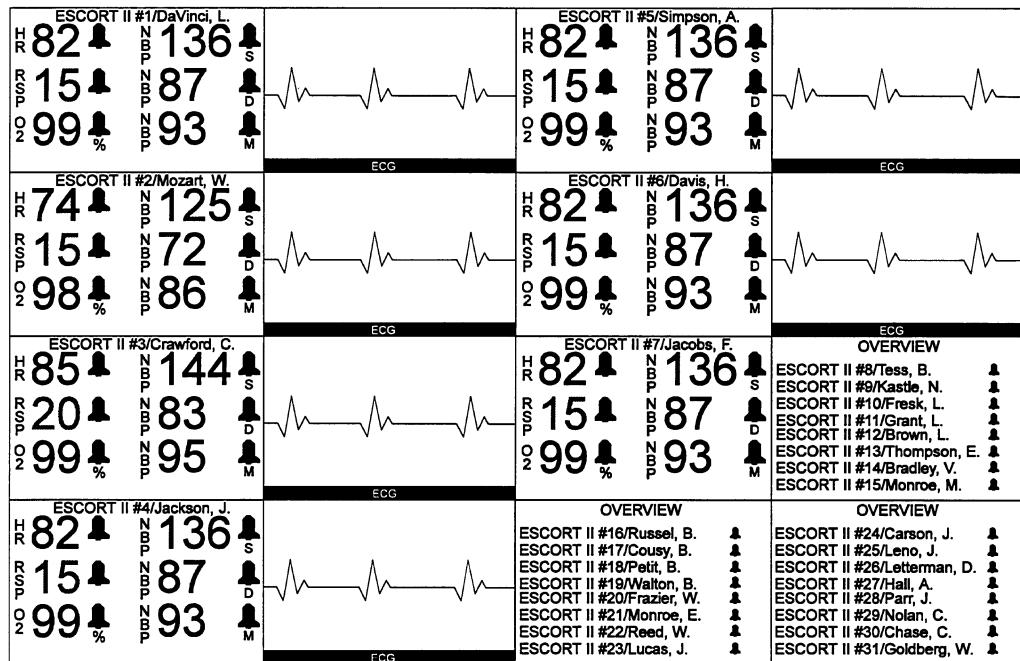
Model 3200B Central Station Auto Configuration - 12 Patients



Model 3200B Central Station Auto Configuration - 16 Patients



Model 3200B Central Station Auto Configuration - 23 Patients



Model 3200B Central Station Auto Configuration - 31 Patients

